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WORKING PAPERS

ON THE STRUCTURAL DIMENSION OF COMPETITIVE STRATEGY

SERGUEI KANIOVSKI, MICHAEL PENEDER

145/2001

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WIFO Working Papers, No. 145
April 2001

E-mail addresses: Serguei.Kaniovski@wifo.ac.at, Michael.Peneder@wifo.ac.at
2001/107/W/

On the Structural Dimension of Competitive Strategy

Serguei Kaniovski and Michael Peneder*

Abstract

This paper aims at establishing the existence of systematic differences in the nature of competitive strategies available to individual firms across industries. By means of qualitative content analysis, we extracted a matrix of 76 industries times 12 strategies reported as being characteristic in a series of monographs. Subsequent tests for the statistical significance of observed differences in the typical strategy portfolio show an evident link to an industry's general reliance on intangible investments, human resources, and inputs from external services.

Key Words: Corporate strategy, industrial structure, technological regimes, intangible assets, human resources, external services

JEL Codes: L1, L6, O3

Serguei Kaniovski
Austrian Institute of
Economic Research (WIFO)
P.O. Box 91; A-1030 Vienna
Austria
Tel.: + 43-1-798 26 01 – 231
Fax.: + 43-1-798 93 86
E-mail: kaniovsk@wifo.ac.at

Michael Peneder
Austrian Institute of
Economic Research (WIFO)
P.O. Box 91; A-1030 Vienna
Austria
Tel.: + 43-1-798 26 01 – 480
Fax.: + 43-1-798 93 86
E-mail: peneder@wifo.ac.at

*The authors would like to thank Karl Aiginger, Michael Pfaffermayr, and Gunter Tichy for helpful comments and valuable suggestions.

1. Motivation and Outline

A dominant attitude found in many popular books on business economics is to present corporate strategy as an almost exclusive feat of ingenuity and leadership performed by the top-level executives of the respective company.[1] In more thorough expositions, this thesis is often complemented by an emphasis on the social aspects of firm organization that bring the creative potential within its workforce to economically productive use.[2] Although we acknowledge that strategic choices are made by individuals within the more or less tightly-woven systems of social organization, our purpose in this paper is to test for the existence of a complementary *structural dimension* to corporate strategy. Specifically we demonstrate that systematic differences between industries with respect to their characteristic input relationships, have an important and statistically measurable impact on the set of strategic choices typically considered at the company's executive board.

The core of our view of markets and firm organization is evolutionary. In particular, we share the emphasis on the fundamental diversity in corporate behaviour being a necessary condition for any kind of industrial dynamics. This assertion is rooted in two congruent strands of evolutionary economics. It is a necessary assumption in order to model market competition as a dynamic process driven by the evolutionary interplay of variation, cumulation and selection (e.g. Metcalfe, 1998), and it is also found in the resource-based (Penrose, 1959) or capabilities-based view of the firm (e.g. Teece-Pisano, 1998). All these scholars unequivocally stress the diversity in firm behaviour and the emergence of distinct capabilities as the ultimate source of competitive advantage.

At a first glance, we seem to have stumbled into a contradiction. Namely, if corporate strategy is a phenomena which has to be realised at the level of firms, often depending on individual proficiency and entrepreneurial spirit, why then should structural specifics of the industry have any statistically measurable impact on the firm's strategy? The answer is also deeply moulded into the evolutionary approach that stresses the contingent nature of competitive behaviour. In other words, competitive performance depends on the capability to match a firm's organization and strategy to the technological, social and economic restrictions imposed by its external environment. The immediate consequence of these considerations is also widely accepted among business economists: 'Corporate success derives from a competitive advantage which is based on distinctive capabilities, which is most often derived from the unique character of a firm's relationships with its suppliers, customers, or employees, *and which is precisely identified and applied to relevant markets*' (Kay, 1990, p.4; emphasis added). While the first part of the quote repeats the common emphasis on diversity of firm behaviour, the second part highlights the dependence on the specific characteristics of the market.

Arguing within an explicit evolutionary framework, Dosi and Malerba (1996), as well as Malerba and Orsenigo (1996) address the complex interdependence of individual corporate behaviour and the industry specific business environment in terms of *technological regimes*. They similarly conclude that we must expect a 'powerful restriction on the patterns of organizational learning and evolution, grounded in the specifities of knowledge characteristics of each sector and broadly shared by all firms undertaking those activities' (Dosi and Malerba, 1996, p. 14). The reason is that the 'level and pervasiveness of opportunities, levels of appropriability and cumulativeness, and complexity of the knowledge base, shape and constrain the set of viable behaviour by firms in terms of basic technology strategy and types of organization' (Malerba and Orsenigo, 1996, p. 66). Consequently, these considerations imply the 'empirically testable proposition that, conditional on the "technological regime", all

[1] See e.g. Slywotzky et.al. (1997) and Gilmore (1997).

[2] For some excellent examples see de Geus (1997) as well as Nonaka and Takeuchi (1995) or Nonaka (1993).

firms will be likely to share some proximate organizational and behavioural features' (Dosi and Malerba, 1996, p. 15).

We take this hypothesis as our point of departure, even though the limited nature of our database does not allow us to investigate this proposition directly with respect to observations of individual firm behaviour. Instead we investigate whether industries actually differ in any significant and economically meaningful way with respect to the set of strategic opportunities available to their entrepreneurs. If we can credibly establish the existence of a significant structural dimension to the analysis of corporate strategy, we should consider this a confirmation of the general relevance of the above proposition. In contrast to the frequently practised exclusive reliance on casuistic narratives, this should ultimately strengthen the call for congruent analysis of both (i) market characteristics and (ii) firm behaviour.

Our research plan could be roughly divided into four analytic steps, according to which we have structured this paper. In the first step, we constructed the set of generic competitive strategies, which we believe are particularly important in enhancing a company's overall competitive advantage (Section 2). Then we grouped the industries according to differences in their typical reliance on intangible investments, human resources and external services as productive inputs, using the three new Wifo taxonomies (Section 3). By the means of qualitative content analysis, a comprehensive series of individual industry monographs published in the Panorama of European Industry was mined for indications of relevance of the chosen competitive strategies to the industries under consideration. The Binomial test was then applied in order to discriminate the typical portfolios of competitive strategy by type of industry (Sections 4). In Section 5 we present and discuss our empirical findings. In the last section we draw some general conclusions (Section 6).

2. Constructing a Stylized 'Competitive-Strategy-Space'

An obvious difficulty with defining a testable set of corporate strategies lies in the commercial nature of much of the literature in this field. Applying the logic of the competitive process to this specific market, commercial success of an enterprise depends on being different and yields the highest returns when specific solutions can be credibly presented in a new and unprecedented fashion. In contrast to the paradigm of scientific production, the cumulation of ideas and their embeddedness in existing trajectories of professional discourse is much less valued. The unfortunate consequence of the former practice is a general lack of authoritative reference to a commonly accepted set of generic strategies.

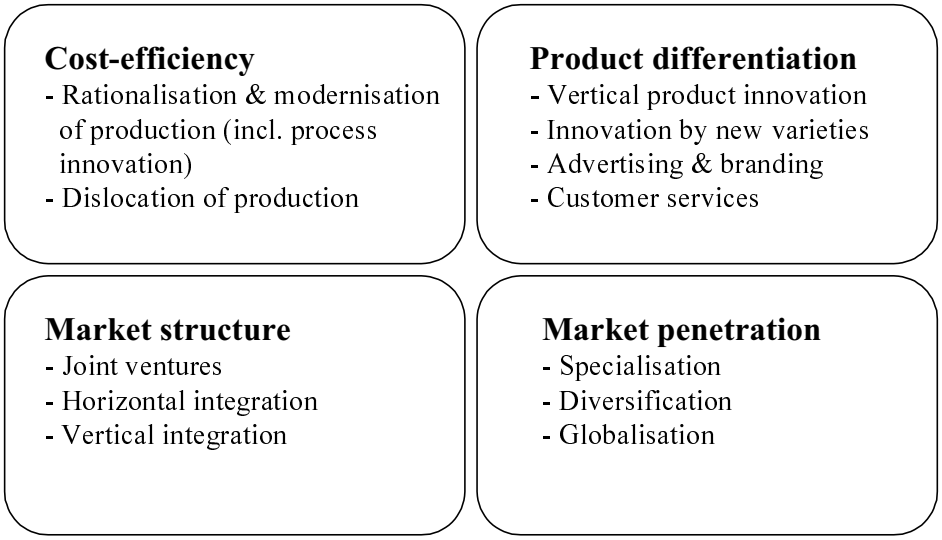
A more fundamental problem is raised by John Kay (1993), who most radically states that `there are no recipes, and generic strategies, for corporate success. There cannot be, because if there were their general adoption would eliminate any competitive advantage which might be derived. The foundations of corporate success are unique to each successful company´ (Kay, 1993, p. vii). While we agree with his objection to simple 'recipes' in the sense of popular checklists, we cannot see, why the emphasis on the uniqueness of individual action should render a systematisation of competitive strategies that can be successfully pursued worthless. Incidentally, Kay himself presented a very useful systematisation of such strategies, which has also influenced our considerations. The two other major sources from which we derive relevant dimensions of the 'strategy-space' are Porter (1980) and Malerba and Orsenigo (1996).

First, we offer some conceptual clarifications. We follow Kay in asserting that 'corporate strategy is concerned with the firm's choice of business, markets and activities' (Kay, 1993, p. 4). This definition contrasts strategic choice with operations management, emphasising the crucial distinction that the former has the responsibility to establish the sources of a firm's unique competitive advantages, whereas only the latter can strive towards the implementation of commonly acknowledged 'best practices'. Conversely, we agree with Michael Porter

(1980) in emphasising the distinction between two very basic dimensions of choice, (i) the strive for cost leadership on the one hand, and (ii) the differentiation of products and services on the other. Although the cost-efficiency in production is largely a matter of operations management, the general trade-off between the goals of cost leadership versus quality differentiation also involves strategic choices on investment priorities and industrial location. We try to capture this aspect by two different variables. The first indicates the choice to invest in the *rationalisation and modernisation* of production (including process innovations), that often leads to an increased substitution of labour; the second refers to cost-based choices to *dislocate* production away from high-wage locations in order to benefit from cheap labour resources in less developed economies.

Additionally, Kay (1993) supplies a useful categorisation of what he calls 'primary sources of distinctive capabilities'. He distinguishes three specific dimensions of strategic choices contributing to the differentiation of products and services: (i) innovation, (ii) reputation and (iii) architecture. The first one is represented in our analysis by the two variables of *vertical differentiation through substantial technological innovation,* and *horizontal differentiation by introducing new varieties*. We also use *advertising and brand creation* as our variable representing strategic investments to enhance reputation. 'Architecture' is an enormously comprehensive label for internal organization as well as the firm's external relationships, especially those with suppliers, customers, and competitors. The complex task of firm organization is outside the scope of this analysis. We do however include a variable for *customer services* as a means to enhance client specific differentiation.

Figure 1: The 'four-leafed clover' of competitive strategy



Other aspects concerning market structure as the specific architecture of supply-side relationships are captured by the variables *joint ventures*, *horizontal integration*, and *vertical integration*. We see the common characteristic of these strategies in that they are all concerned with different forms of organizational integration intended to increase the joint returns of otherwise separately exploited assets. The costs of organizational integration are then expected to be compensated by three general sources for increasing competitive advantage. First of all, firms may benefit from cost reductions due to economics of scale and scope. Secondly, they might profit from synergies between complementary competencies. Thirdly, organizational integration ultimately influences market structure and has the potential to shift the balance of power vis-à-vis competitors, customers as well as suppliers or distributors.

We have also selected a fourth major dimension along which firms must make their strategic choices. This concerns the firms positioning regarding its degree and direction of market penetration. We therefore include the following variables of *specialisation*, *diversification*, and *globalisation*, each of them characterising a specific choice about the desired route of expansion. In the first case expansion depends on the focused cumulation of specific knowledge assets, in the second the appropriation of core competencies is spread to a variety of more or less related products (Legraw, 1984), and the third refers to the choice of covering new geographic markets. Malerba and Orsenigo (1996) offer a thorough discussion of how the pervasiveness of opportunity conditions affects the trade-offs between specialisation and diversification. Caves (1996) and Dunning (1994) provide insightful analysis into the determinants affecting firm's choices to go multinational.

Shaped like a 'four-leafed clover', Figure 1 offers a schematic representation that summarises our choice of twelve separate dimensions of competitive strategy-choices. Apparently, we have constructed that set with a highly eclectic attitude, trying to synthesise a few approaches which we considered as particularly relevant for our purpose. We do not pretend that the outcome is a complete representation of strategy-space.

3. Characterising Industrial Structure

The new WIFO taxonomies were created in a series of research projects undertaken on behalf of the European Commission in preparation for its annual reports on European Competitiveness.[3] The taxonomies were initially intended to offer a coherent set of empirical tools that facilitates inquiries into industrial performance with respect to the intangible sources of competitive advantage. The first taxonomy focuses on the distinction between tangible and intangible factor inputs, the second one is directed at the dimension of human resources, and the third segregates industries according to differences in the intensity of external service inputs. *Taxonomy I* was first applied in the 1998 Competitiveness Report. The dimension of human resources (`*taxonomy II*´) was added in 1999. The most recent addition includes differentiation of industries according to the varying degrees of demand for external service inputs. This last *taxonomy III* had been prepared for the Competitiveness Report 2000.

Compared to earlier classifications, the new WIFO taxonomies are distinguished by their reliance on statistical cluster analysis, which is a powerful technique specifically designed for classifying observations on behalf of their relative similarities with respect to a multidimensional array of variables. The basic idea is that of dividing a specific data profile into segments by creating maximum homogeneity within and maximum separation between them (Peneder, 1995). In the end, for each taxonomy 100 NACE 3-digit manufacturing industries have been completely and exclusively categorised. All the distinct industry types are summarised in Table 1.

The clustering process for *Taxonomy I* is based on US data for wages and salaries, investments in physical capital, advertising outlays and R&D expenditure. These are assumed to span four independent dimensions of productive inputs for revenue generation. Ratios to total value added have been calculated for wages and physical capital. Expenditures on advertising and R&D are represented by their ratio to the total sales. The latter are directly derived from balance sheet data.[4] *Taxonomy II* is based on occupational data, distinguishing first the two types of white-collar and blue-collar workers, and then for each, the shares of respectively high- and low-skilled labour. The data source stems from the OECD and covers employment shares for a sample of developed economies. The final *taxonomy III* was created

[3] Detailed information on the final classifications as well as on the specific data sources and the methodology applied is offered in Peneder (1999, 2000, and 2001). For first applications see European Communities (1998, 1999, 2000).

[4] Data sources are DEBA (labour and capital inputs) and COMPUSTAT (advertising and R&D).

using US input-output data. It reveals typical combinations of service inputs purchased via external market transactions at a very disaggregate level of 500 times 500 industries.

Table 1: The Wifo taxonomies of manufacturing industry

***Taxonomy I*: Factor input combinations**	
• Mainstream manufacturing (MM) • Labour intensive industries (LI) • Capital intensive Industries (CI)	• Marketing driven industries (MDI) • Technology driven industries (TDI)
***Taxonomy II*: Skill requirements**	
• Low-skill industries (LS) • Medium-skill blue-collar industries (MBC)	• Medium-skill white-collar industries (MWC) • High-skill industries (HS)
***Taxonomy III*: External service inputs**	
• Other industries • Industries with high inputs from transport services (ITRS)	• Industries with high inputs from retail and advertising services (IR&S) • Industries with high inputs from information- and knowledge-based services (IKBS)

As in case of any classification, much heterogeneity within each individual category can still be found. Additionally, we cannot assume perfect correspondance between different economic areas with respect to the typical combinations of the underlying variables. As strategy portfolios have been extracted from monographs on European industries, the exclusive reliance on US data in the course of creating taxonomies I and III might raise the objection that the respective factor intensities of the US economy cannot be compared to those in the EU. Fortunately, it is one of the advantages of the taxonomic approach, that precise correspondence is not necessary for applying the classification as a discriminatory variable. The only requirement is consistency as far as membership within the clear-cut boundaries of the final types of industry is concerned. This obviously is a much weaker constraint.

4. Mining a Unique Data Source

The Panorama of European Industry 1997, jointly published by EUROSTAT and the European Commission DGIII, features extensive monographs on most of the individual NACE 3-digit manufacturing industries. These monographs are authored by international consultants and European business associations representing the respective industries. Although the monographs vary in style and language they follow a common structure that frequently includes a section on corporate strategy. This qualitative information is the basis of the following statistical analysis of content.

For each monograph, all strategic options that had been explicitly mentioned as being of relevance to the firms of the particular industry have been collected and recorded in terms of

the catchwords used. Then, this qualitative information has been consolidated along the dimensions of our 'competitive strategy space' into a matrix A of dimension $I = 76$ manufacturing industries times $S = 12$ generic strategies. The typical element of A is

$$a_{is} = \begin{cases} 1 - \text{if the strategy } s \text{ is reported to be of relevance to industry } i \\ 0 - \text{if the strategy } s \text{ is not reported to be of relevance to industry } i \text{ .} \end{cases}$$

Finally, the three distinct taxonomies presented in Table 1 were used to discriminate industries according to typical input relationships, which supposedly reflect systematic differences in the prevalent technological regimes.

It is of particular interest to us whether the types of a taxonomy differ in terms of their strategy portfolios. Formally, we test whether the probability of occurrence of some strategy within a given type is different from the probability of occurrence of the same strategy in the rest of industries. Recall that the individual types of industries are listed in Table 1. Let us index n industries $(1 \le n \le I)$ that constitute a particular type by $j = 1,2,\ldots,n$, and the remaining industries by $n + k$, $k = 1,2,\ldots,(I - n)$. Given the binary nature of our data, we assume that for a given strategy $\bar{s}$, the series of realisations $a_{1\bar{s}},\ldots,a_{n\bar{s}}$ and $a_{(n+1)\bar{s}},\ldots,a_{I\bar{s}}$ are independent Bernoulli trials, whose probabilities of success are θ and θ^* respectively. That is $P(a_{j\bar{s}} = 1) = \theta$ and $P(a_{(n+k)\bar{s}} = 1) = \theta^*$. Under the above assumption, we can test $H_O : \theta = \theta^*$ against the alternative $H_A : \theta \neq \theta^*$, using the two-sided Binomial test. For each of the twelve strategies, we report the arithmetic means

$$\bar{\theta} = \frac{1}{n}\sum_{j=1}^{n} a_{j\bar{s}} \qquad \overline{\theta^*} = \frac{1}{I-n}\sum_{k=1}^{I-n} a_{(n+k)\bar{s}} \quad ,$$

and $P-$the probability that $\theta = \theta^*$ under the null hypothesis. For a prescribed confidence level $\alpha \in [0,1]$ reject the null hypothesis if $P \le \alpha$. In the tables we denote the results which are significant at $\alpha = 0{,}1$ by '*', $\alpha = 0{,}05$ by '**' and $\alpha = 0{,}01$ by '***'.

We believe that the Panorama is a truly unique source of information on competitive strategies. Unfortunately, this effort is not undertaken on a regular basis. For instance, the recently published new edition of the Panorama of European Industries for the year 2000 has been much shortened in scope and depth, making the compilation of a similar data set impossible. We therefore relied solely on the 1997 edition, which we considered a rare treasure that simply had to be mined for analytic use.

We are, however, also keenly aware of the grave limitations that the specific nature of the data imposes on the analysis. To begin with, the monographs constitute an extremely 'arid' source for data mining. On our part, the only route towards quantification was the rudimentary distinction whether a strategy has been mentioned as being of particular importance to a given industry or not. This resulted in a set of binary variables without any further information about differences in kind or degree of their relevance. The set of available statistical tools that can be applied in a serious manner is thus much restricted. Secondly, we are also aware that the fact that we actually had to create the initial data matrix ourselves, may cast serious doubts on the credibility of the subsequent results. The fact that qualitative analysis of content always involves a considerable degree of discretion and subjective evaluation makes our work even more vulnerable to such criticism. From the very beginning, splitting the responsibility for undertaking the analysis of content and the creation of taxonomies, seemed to be the only practically feasible solution to the credibility problem. This measure had been relentlessly pursued throughout this work. The latter task was in each

case and for separate purposes undertaken by Michael Peneder, whose intimate knowledge on the positioning of industries within the three taxonomies would inevitably have interfered, if even unconscious, with the qualitative evaluations. Conversely, it was Serguei Kaniovski who independently undertook the qualitative analysis of content without having ever been involved in the taxonomic work before. We believe that it allows us to explicitly deny any judgmental bias in the extraction of the initial strategy portfolio of 3-digit industries. To dispel the last of doubts, we would be happy to provide our data matrix upon request.

5. Empirical Findings

The Set of Disposable Strategies

We start with the simple question whether the *number* of strategic choices typically available to the firm depends on the type of industry it is operating in. For that purpose, for a given type of industry we look at the ratio of the number of occurrences of all strategies, mentioned as being of particular importance, to the total number of entries. In two of the three taxonomies, this ratio shows a surprisingly clear tendency of the number of strategic options to increase with the presumed sophistication of the underlying technological regime. Discriminating according to *taxonomy I*, labour intensive industries show by far the lowest average number of occurrences per industry for any strategy, followed by capital intensive and marketing driven industries. Applying the Binomial test to the series of realisations $a_{1s},\ldots,a_{ns}$ and $a_{1s},\ldots,a_{ms}$ for $s = 1,\ldots,S$, reveals that the number of strategies reported in labour intensive industries is significantly lower than in the other industries. In mainstream manufacturing and technology driven industries it is significantly higher.[5]

The average number of entries also increased with the corresponding level of human resources employed (*taxonomy II*). The number of occurrences in high-skilled industries is significantly larger, in low-skilled industries significantly smaller than for the other groups. In contrast, no such intuitively appealing pattern had surfaced with regard to inputs of external services *(taxonomy III)*. Occurrences are significantly less frequent in industries with high inputs from transport services as opposed to the group of `other´ industries and those characterised by high inputs from retail and advertising. Industries with high inputs from knowledge-based services do not differ significantly from the other types.

Table 2: Bimomial tests on the total number of reported strategies

Total of 12 Strategies	$\overline{\theta}$		$\overline{\theta^*}$	P	Significance
Mainstream	0.33	>	0.30	0.09	*
Labour intensive	0.25	<	0.32	0.01	**
Capital intensive	0.30		0.30	0.22	
Marketing driven	0.30		0.30	0.21	
Technology driven	0.36	>	0.29	0.03	**
Low skill	0.27	<	0.32	0.03	**
Medium (blue collar)	0.29		0.31	0.14	
Medium (white collar)	0.32		0.29	0.11	
High skill	0.39	>	0.29	0.02	**
Other	0.33	>	0.29	0.06	*
ITRS	0.24	<	0.33	0.00	**
IR & S	0.34	>	0.29	0.03	**
IKBS	0.29		0.31	0.17	

Cost-Efficiency

[5] In computation of the test statistic we resort to the normal approximation to binomial distribution.

In the following, we provide a brief summary of the most important findings on the structural dimension of competitive strategies. To begin with, the group of cost-based strategies that includes *rationalisation*, *mechanisation* and *modernisation* of production turned out to be the basic requirement for maintaining competitiveness. Occurrences falling into this group are almost uniformly distributed across all industry types. According to our data and method used, they belong to a dimension of strategy-choice in which the structural distinction is hardly of any importance. As a consequence, no significant differences between industries can be reported with regard to typical factor combinations, although the mean entries for both marketing and technology driven industries turn out to be lower than for the other types. Similarly, no significant discrimination can be made with respect to the classification based on external service inputs. Only when discriminating industries along the human resources dimension, the rationalisation of production appears to be significantly higher in medium-skilled blue-collar industries - this kind of increasing the cost efficiency of production was reported in 19 out of 20 industries.

Dislocation of production (usually explained in the monographs as being due to savings in labour costs) is literally absent as an option of strategic choice in the group of high-skilled industries. The further discrimination according to types of factor input combinations reveals a remarkable differentiation with regard to the two ideal forms of intangible investments captured by that taxonomy. Whereas the qualitative analysis of content shows significant higher entries for marketing driven industries, the dislocation of production due to cost advantages is hardly relevant in technology driven industries. Regarding *taxonomy III*, transport intensive industries are revealed to be significantly less exposed to dislocation, while this option appears to be more common to the group of 'other' industries. This group comprises of all industries without a pronounced dependence on inputs from external service suppliers.

Differentiation

Turning to competitive strategies aimed at increasing product differentiation, we recapitulate the common hypothesis which says that intangible investments, higher labour skills and inputs from specialised services raise the opportunities to differentiate output. Reporting only the statistically significant instances, *vertical product innovation* was most pronounced in technology driven industries.[6] It is also of high importance in high-skilled and medium-skilled white-collar industries and in mainstream manufacturing. It matters significantly less in low-skilled, labour intensive and marketing driven industries. The demand for external service inputs seems to play no significant role.

In contrast, differentiation by horizontal product innovation, i.e. the *introduction of new varieties* matters most in marketing driven and low-skilled industries, but hardly does so in labour intensive industries. In the monographs on mainstream manufacturing and high-skilled industries, the opportunity to gain competitive advantage by broadening the variety of products was never mentioned. Again, the classification by external service inputs has no pronounced discriminatory power along this dimension of corporate strategy.

This picture changes dramatically when we turn to the related category of *advertising and branding*. Here all the entries in the strategy-portfolio-matrix are – again not surprisingly – shared by industries with high levels of external inputs from retail and advertising services. The same holds true for the group of 'other' industries. Applying the two other classifications marketing driven industries again rank ahead of the other groups. Additionally, advertising and branding appears to be of particular relevance for the odd couple of high- and low-skilled industries, but not so in both types of medium-skilled industries.

[6] Although this result should have been expected, it nevertheless confirms the general robustness of the initial industry classification.

Turning to the final strategy-variable along the dimension of product differentiation, the complementary supply of specific *customer services* is most important in mainstream manufacturing (the category, which for example includes the entire machinery sector) and least in low-skilled industries. Due to the fact that this kind of strategic opportunity was only mentioned to be of relevance in 13 out of 76 industries, the Binomial test failed to indicate any other significant discriminations.

Market Structure

To improve its access to the markets and bypass bottlenecks in often highly concentrated distribution services, *vertical integration* appears to be most important in the consumer oriented marketing driven industries. Low-skilled industries also show significantly more entries for this type. In contrast, its relevance was never mentioned in mainstream manufacturing, and only in one out of twenty medium-skilled blue collar industries. Discriminating industries by their use of external service inputs reveals no further significant structural dimension to corporate strategy.

Conversely, mainstream manufacturing and high-skilled industries show most entries for *horizontal integration*, marketing driven industries, the lowest. The latter observation is somewhat compromised by the fact that these industries, which heavily rely on external inputs from retail and advertising services, enjoy the highest number of occurrences. Industries with high level of inputs from knowledge-based services appear least inclined to horizontal mergers and acquisitions.

Interestingly, industries with high level of inputs from knowledge-based services rely much more on co-operation by *joint ventures*, which are also most frequent in capital intensive, technology driven- and medium-skilled white collar industries. Joint ventures seem to offer the least opportunities for the creation of competitive advantages in marketing driven and low-skilled industries as well as industries with a high level of external inputs from transport or retail and advertising services.

Route of Expansion and Market Penetration

The strategic opportunities along the dimensions of expansion and market penetration appear to have been rather neglected by the writers of the industry monographs. In total, *globalisation* was only mentioned eight times, so that no meaningful differentiation came to surface and we have to disregard this variable. *Diversification* was mentioned even less frequently, but four out of the six entries appeared in one of the industries characterised by high external inputs from retail and advertising services. Regarding *taxonomy I*, marketing driven industries slightly missed the target of being statistically significant at the 10 % level, although they had attracted three out of six occurrences.

'Back to the core' is a popular idea of which authors of the monographs seemed to be more aware than in the case of the above variables. We believe this to be one reason why *specialisation* was mentioned at least fifteen times. The mean entries are highest in technology driven and capital intensive industries (presumably both involving large sunk costs and plant specific economies of scale), as well as in industries with high levels of external inputs from knowledge-based services. Hence, the complexity of the underlying knowledge base or technological regime seems to be the most decisive factor influencing the relevance of the determination to stick closely to a narrow set of core-competencies as a source to sustain competitive advantage. In contrast, specialisation has never been mentioned in any of the marketing driven industries (presumably involving more brand/product specific economies of scale). This is also consistent with the larger emphasis on diversification and the introduction of new product varieties reported for the same type above.

Table 2: Summary of the Binomial test results

Type of industry	Strategies mentioned significantly more ... frequently to be of importance	less ...
Factor inputs		
Mainstream manufacturing	**Horizontal integration**; Technological innovation;	**New varieties**; Vertical integration;
Labour intensive ..		**Technological innovation**;
Capital intensive ..	Specialisation; Joint ventures;	
Marketing driven ..	**New varieties; Brand creation**; Dislocation; Vertical integration;	**Technological innovation; Specialisation;** Horizontal integration; Joint ventures;
Technology driven industries	**Technological innovation**; Specialisation;	Dislocation;
Skill requirements		
Low skill ..	**Brand creation**; New varieties;	**Technological innovation**;
Medium (blue collar) ..	**Rationalisation**;	Brand creation; Vertical integration;
Medium (white collar)..	**Technological innovation**;	Brand creation;
High skill industries	**Technological innovation**; Brand creation;	Dislocation; Horizontal integration;
External service inputs		
Other	Dislocation; Brand creation; Joint ventures;	
High inputs of transport		**Dislocation**; Brand creation; Joint ventures;
.. retail and advertising	**Brand creation; Diversification**; Horizontal integration;	
.. knowledge-based services	**Joint ventures; Specialisation**;	**Brand creation**; Horizontal integration;

Note: Strategies in bold letters are significant at the 1 %, others at the 5 % level.

6. Summary and Conclusions

Despite the limitations imposed by the nature of the data, our empirical analysis demonstrates that the structural dimension of systematic differences between industries significantly discriminates corporate strategies that are typically pursued in order to enhance the firm's competitive advantage. The application of three distinct industry classifications has allowed for a multifaceted screening of such differences. The Binomial test proved to be adequate for selecting only those effects which are statistically significant.

Among the many individual results we consider the following to be most telling in terms of their supposed economic effects:

- *The portfolio of disposable strategies*. Structural differences with regard to intangible assets, human resources and reliance on external service inputs significantly affect the choice of corporate strategies. In general, skill intensive and technology driven industries appear to have the largest portfolio of competitive strategy at their disposal. We interpret this as an indication of the fact that these industries have to operate within the most complex business environment. We generally expect these environments to be most demanding to strategic choices, but also offering better opportunities for entrepreneurial profits.

- *Reducing the labour intensity of production*. In all of the industry types cost savings by the process innovation and the continuos rationalisation and modernisation of production is the basic and indispensable ingredient of any corporate strategy mix. These strategies typically lead to a reduction in the labour intensity of production. Among industries, medium-skilled blue-collar are noted to resort to this solution most frequently. This should imply a stronger downward pressure on their job numbers, which is consistent with the reported decline of blue-collar relative to white-collar jobs within manufacturing employment (e.g. in Colecchia-Papaconstantinou, 1996).
- *Local embeddedness.* The dislocation of production, which is aimed at cutting costs such as for labour or the supply of raw materials, is an important choice for marketing driven industries. This option is revealed to be of less importance for industries with high inputs from transport services as well as for technology driven and high-skilled industries. The two latter types appear to be largely tied in their locational choices to the local availability of human resources and specialised knowledge.
- *Strategic alliances, mergers & acquisitions*. Technology driven industries appear to be particularly inclined towards horizontal mergers and the participation in joint ventures, networking or similar kinds of temporary co-operation between firms. In our view this primarily indicates awareness for the need to achieve an efficient pooling of specific knowledge resources. In contrast, marketing driven industries turned out to be least willing to participate in joint ventures or horizontal mergers alike. Instead they often strive for vertical integration. This suggests less knowledge-based or efficiency oriented motives for mergers and acquisitions, but a strong strategic need to secure control over distribution channels.
- *Vertical versus horizontal differentiation*. Marketing and technology driven industries are both characterised by a pronounced dependence on large-scale intangible investments for increasing product differentiation. But specifically contrasting their strategic portfolio, corporate success here relates to a quite distinct logic of competitive strategy. Whereas marketing driven industries differentiate mostly by the introduction of new product varieties and brand affiliations, technology driven industries do so by investment in research and development intended for substantial vertical product innovations.

We are keenly aware that the validity of the individual results is compromised by the 'arid' nature of our data. Ideally, comprehensive study at the firm level would be required to investigate the degree of variation in corporate strategies within each industry. Additionally, we must warn that the large involvement of subjective evaluations, initially in the writing of the industry monographs and in our subsequent analysis of content, impinges on the desired robustness of the findings. Nevertheless, by their mere scope and degree of comprehensive coverage the monographs allowed for a meaningful statistical analysis and, in our view, this justifies the effort of mining this quite unique data source.

This paper originated in the desire to investigate whether a pronounced structural dimension of corporate strategy can be identified. Even if we interpret all the individual results with appropriate caution – and we certainly must do so – the empirical findings confirm the existence of systematic differences between industries that shape and limit the set of typical strategy choices. We conclude that the structural dimension of corporate strategy must be an indispensable complement to the widely accepted emphasis on individual choice and appropriate firm organization.

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Appendix: Binomial tests

(i) cost-efficiency

RATIONALISATION OF PRODUCTION	N	Occurrences	$\bar{\theta}$		$\overline{\theta^*}$	P	Significance
Mainstream	17	14	0.82		0.75	0.339	
Labour intensive	17	14	0.82		0.75	0.339	
Capital intensive	9	8	0.89		0.75	0.291	
Marketing driven	21	14	0.67		0.80	0.109	
Technology driven	12	8	0.67		0.78	0.258	
Low skill	26	18	0.69		0.80	0.130	
Medium (blue collar)	20	19	0.95	>	0.70	0.007	***
Medium (white collar)	22	15	0.68		0.80	0.144	
High skill	8	6	0.75		0.76	0.594	
Other	21	16	0.76		0.76	0.575	
ITRS	21	16	0.76		0.76	0.575	
IR & S	21	17	0.81		0.75	0.348	
IKBS	13	9	0.69		0.78	0.323	
DISLOCATION OF PRODUCTION	N	Occurrences	$\bar{\theta}$		$\overline{\theta^*}$	P	Significance
Mainstream	17	6	0.35		0.29	0.361	
Labour intensive	17	4	0.24		0.32	0.316	
Capital intensive	9	2	0.22		0.31	0.429	
Marketing driven	21	10	0.48	>	0.24	0.014	**
Technology driven	12	1	0.08	<	0.34	0.046	**
Low skill	26	9	0.35		0.28	0.297	
Medium (blue collar)	20	7	0.35		0.29	0.339	
Medium (white collar)	22	7	0.32		0.30	0.489	
High skill	8	0	0.00	<	0.34	0.037	**
Other	21	10	0.48	>	0.24	0.014	**
ITRS	21	2	0.10	<	0.38	0.004	***
IR & S	21	7	0.33		0.29	0.413	
IKBS	13	4	0.31		0.30	0.586	

(ii) differentiation

CUSTOMER SERVICES	N	Occurrences	$\bar{\theta}$		$\overline{\theta^*}$	P	Significance
mainstream	17	5	0.29	>	0.14	0.070	*
labour intensive	17	3	0.18		0.17	0.567	
capital intensive	9	0	0.00		0.19	0.144	
marketing driven	21	3	0.14		0.18	0.452	
technology driven	12	2	0.17		0.17	0.658	
low skill	26	2	0.08	<	0.22	0.064	*
medium (blue collar)	20	5	0.25		0.14	0.147	
medium (white collar)	22	3	0.14		0.19	0.399	
high skill	8	3	0.38	>	0.15	0.100	*
other	21	3	0.14		0.18	0.452	
ITRS	21	5	0.24		0.15	0.179	
IR & S	21	3	0.14		0.18	0.452	
IKBS	13	2	0.15		0.17	0.596	
INNOVATION BY NEW TECHNOLOGY	N	Occurrences	$\bar{\theta}$		$\overline{\theta^*}$	P	Significance
mainstream	17	11	0.65	>	0.36	0.014	**
labour intensive	17	3	0.18	<	0.49	0.008	***
capital intensive	9	2	0.22		0.45	0.152	
marketing driven	21	4	0.19	<	0.51	0.003	***
technology driven	12	12	1.00	>	0.31	0.000	***
low skill	26	3	0.12	<	0.58	0.000	***
medium (blue collar)	20	6	0.30		0.46	0.105	
medium (white collar)	22	15	0.68	>	0.31	0.000	***
high skill	8	8	1.00	>	0.35	0.000	***
other	21	7	0.33		0.45	0.185	
ITRS	21	7	0.33		0.45	0.185	
IR & S	21	11	0.52		0.38	0.133	
IKBS	13	7	0.54		0.40	0.222	
INNOVATION BY VARIETY	N	Occurrences	$\bar{\theta}$		$\overline{\theta^*}$	P	Significance
mainstream	17	0	0.00	<	0.25	0.007	***
labour intensive	17	1	0.06	<	0.24	0.063	*
capital intensive	9	3	0.33		0.18	0.208	
marketing driven	21	10	0.48	>	0.09	0.000	***
technology driven	12	1	0.08		0.22	0.225	

low skill	26	8	0.31	>	0.14	0.015	**
medium (blue collar)	20	2	0.10		0.23	0.124	
medium (white collar)	22	5	0.23		0.19	0.386	
high skill	8	0	0.00		0.22	0.136	
other	21	6	0.29		0.16	0.116	
ITRS	21	2	0.10	<	0.24	0.097	*
IR & S	21	5	0.24		0.18	0.332	
IKBS	13	2	0.15		0.21	0.480	
BRAND CREATION	N	Occurrences	$\overline{\theta}$		$\overline{\theta^*}$	P	Significance
mainstream	17	5	0.29		0.27	0.506	
labour intensive	17	2	0.12	<	0.32	0.054	*
capital intensive	9	1	0.11		0.30	0.198	
marketing driven	21	11	0.52	>	0.18	0.000	***
technology driven	12	2	0.17		0.30	0.260	
low skill	26	11	0.42	>	0.20	0.005	***
medium (blue collar)	20	2	0.10	<	0.34	0.016	**
medium (white collar)	22	3	0.14	<	0.33	0.035	**
high skill	8	5	0.63	>	0.24	0.021	**
other	21	9	0.43	>	0.22	0.025	**
ITRS	21	2	0.10	<	0.35	0.010	**
IR & S	21	10	0.48	>	0.20	0.004	***
IKBS	13	0	0.00	<	0.33	0.005	***

(iii) market structure

HORIZONTAL INTEGRATION	N	Occurrences	$\overline{\theta}$		$\overline{\theta^*}$	P	Significance
mainstream	17	14	0.82	>	0.47	0.004	***
labour intensive	17	8	0.47		0.58	0.261	
capital intensive	9	4	0.44		0.57	0.339	
marketing driven	21	8	0.38	<	0.62	0.024	**
technology driven	12	8	0.67		0.53	0.259	
low skill	26	13	0.50		0.58	0.265	
medium (blue collar)	20	9	0.45		0.59	0.150	
medium (white collar)	22	13	0.59		0.54	0.387	
high skill	8	7	0.88	>	0.51	0.042	**
other	21	10	0.48		0.58	0.222	
ITRS	21	13	0.62		0.53	0.267	
IR & S	21	15	0.71	>	0.49	0.033	**
IKBS	13	4	0.31	<	0.60	0.030	**
VERTICAL INTEGRATION	N	Occurrences	$\overline{\theta}$		$\overline{\theta^*}$	P	Significance
mainstream	17	0	0.00	<	0.24	0.010	**
labour intensive	17	2	0.12		0.20	0.299	
capital intensive	9	2	0.22		0.18	0.498	
marketing driven	21	7	0.33	>	0.13	0.012	**
technology driven	12	3	0.25		0.17	0.342	
low skill	26	7	0.27	>	0.14	0.053	*
medium (blue collar)	20	1	0.05	<	0.23	0.036	**
medium (white collar)	22	5	0.23		0.17	0.301	
high skill	8	1	0.13		0.19	0.530	
other	21	4	0.19		0.18	0.548	
ITRS	21	4	0.19		0.18	0.548	
IR & S	21	4	0.19		0.18	0.548	
IKBS	13	2	0.15		0.19	0.539	
JOINT VENTURES	N	Occurrences	$\overline{\theta}$		$\overline{\theta^*}$	P	Significance
mainstream	17	7	0.41		0.37	0.460	
labour intensive	17	5	0.29		0.41	0.245	
capital intensive	9	6	0.67	>	0.34	0.049	**
marketing driven	21	4	0.19	<	0.45	0.011	**
technology driven	12	7	0.58	>	0.34	0.078	*
low skill	26	7	0.27	<	0.44	0.060	*
medium (blue collar)	20	8	0.40		0.38	0.492	
medium (white collar)	22	11	0.50	>	0.33	0.078	*
high skill	8	3	0.38		0.38	0.636	
other	21	11	0.52	>	0.33	0.049	**
ITRS	21	4	0.19	<	0.45	0.011	**
IR & S	21	5	0.24	<	0.44	0.051	*
IKBS	13	9	0.69	>	0.32	0.006	***

(iv) market penetration

GLOBALISATION	N	Occurrences	$\overline{\theta}$		$\overline{\theta^*}$	P	Significance
mainstream	17	3	0.18		0.08	0.171	
labour intensive	17	2	0.12		0.10	0.529	
capital intensive	9	0	0.00		0.12	0.320	
marketing driven	21	1	0.05		0.13	0.234	
technology driven	12	2	0.17		0.09	0.313	
low skill	26	2	0.08		0.12	0.354	
medium (blue collar)	20	3	0.15		0.09	0.261	
medium (white collar)	22	2	0.09		0.11	0.552	
high skill	8	1	0.13		0.10	0.581	
other	21	4	0.19	>	0.07	0.063	*
ITRS	21	1	0.05		0.13	0.234	
IR & S	21	3	0.14		0.09	0.298	
IKBS	13	0	0.00		0.13	0.171	
DIVERSIFICATION	N	Occurrences	$\overline{\theta}$		$\overline{\theta^*}$	P	Significance
mainstream	17	1	0.06		0.08	0.570	
labour intensive	17	1	0.06		0.08	0.570	
capital intensive	9	0	0.00		0.09	0.428	
marketing driven	21	3	0.14		0.05	0.106	
technology driven	12	1	0.08		0.08	0.623	
low skill	26	2	0.08		0.08	0.619	
medium (blue collar)	20	2	0.10		0.07	0.420	
medium (white collar)	22	0	0.00	<	0.11	0.075	*
high skill	8	2	0.25	>	0.06	0.077	*
other	21	2	0.10		0.07	0.460	
ITRS	21	0	0.00	<	0.11	0.089	*
IR & S	21	4	0.19	>	0.04	0.006	***
IKBS	13	0	0.00		0.10	0.273	
SPECIALISATION	N	Occurrences	$\overline{\theta}$		$\overline{\theta^*}$	P	Significance
mainstream	17	1	0.06	<	0.24	0.063	*
labour intensive	17	5	0.29		0.17	0.146	
capital intensive	9	4	0.44	>	0.16	0.046	**
marketing driven	21	0	0.00	<	0.27	0.001	***
technology driven	12	5	0.42	>	0.16	0.028	**
low skill	26	3	0.12		0.24	0.104	
medium (blue collar)	20	5	0.25		0.18	0.281	
medium (white collar)	22	6	0.27		0.17	0.148	
high skill	8	1	0.13		0.21	0.486	
other	21	2	0.10	<	0.24	0.097	*
ITRS	21	5	0.24		0.18	0.332	
IR & S	21	2	0.10	<	0.24	0.097	*
IKBS	13	6	0.46	>	0.14	0.006	***

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Verkaufspreis: ATS 100,00 bzw. EUR 7,27