"AN EMPIRICAL INVESTIGATION OF MANUFACTURING STRATEGIES IN EUROPEAN INDUSTRY"

by

Arnoud DE MEYER*

N° 90/36/TM

* Associate Professor of Technology Management, INSEAD, Boulevard de Constance, Fontainebleau 77305 Cedex, France

Printed at INSEAD,
Fontainebleau, France

AN EMPIRICAL INVESTIGATION OF MANUFACTURING STRATEGIES IN EUROPEAN INDUSTRY

Arnoud De Meyer
Associate Professor of
Technology Management
INSEAD
Bd. de Constance
77300 Fontainebleau
tel 33-1-60724000
fax 33-1-60724242
bitnet MEYER @ FREIBA51

Abstract

The need for the development of a manufacturing strategy has been stressed greatly over the last decennium. Few authors have however attempted to define generic manufacturing strategies. Roth and Miller have proposed an empirical approach to determine manufacturing strategies on the basis of a North American sample. In this paper we apply their method on a European sample in order to determine the robustness of their results both over time and in different geographical regions. The proposed method proves to be useful, but does not lead to generic strategies for both Europe and North America. This may be explained by bias in the samples or by differences between the strategies of European and North American firms. For the European sample the results prove to be stable over time. We can distinguish three categories: high performance products manufacturers, manufacturing innovators and a marketing oriented group of manufacturers.

keywords : manufacturing strategy, generic strategies

1. Introduction

Over the last decade the strategic role of manufacturing has received more attention in the operations management literature. This increased attention is partly due to the mounting awareness that manufacturing has an important role to play in improving the sustainable competitive advantage of the company or the industry. A team from M.I.T. came recently to the conclusion, on the basis of eight industry studies (Derouzos et al, 1989), that the revival of the U.S. industry must come from a fresh look at the production system, a new industrial paradigm as they called it. If manufacturing has a strategic role to play, it is conceivable that a company goes beyond using manufacturing as a tool to implement a wider business strategy, and that it develops a manufacturing strategy proper.

The content of a manufacturing strategy was probably first defined by Skinner's seminal work (1966) and further refined by Buffa (1984), Schmenner (1982), Hill (1985), Wheelwright (1978, 1981). In particular Hayes, Wheelwright and Clark (Hayes and Wheelwright, 1984; Hayes, Wheelwright and Clark, 1988) have made an important contribution in analysing the role of manufacturing in relation to the other functions of the company and the determinants of what a manufacturing strategy consists of. Although most of this work is clear in defining the components of a manufacturing strategy, it does not attempt to (and probably does not intend to) explore whether one can define generic manufacturing strategies. Most of the work on manufacturing strategy discusses the need to make trade-offs between different capabilities (Skinner, 1978), the need for focus (Skinner, 1974), lists the categories of decisions and policies (Wheelwright, 1978; Schmenner, 1979; De Meyer and Ferdows, 1987), or emphasizes the change in manufacturing strategy according to the life-cycle (Hill, 1985). Few papers actually define the content of a manufacturing strategy, or take a position in determining which manufacturing strategies are superior.

Hayes and Wheelwright define four stages in the development of manufacturing's strategic role (1984). In their classification the third and fourth stages are the ones where manufacturing is either derived from a business strategy, or is aggressively used to build corporate competence. These two stages appear to be based on superior manufacturing strategies.

But what it precisely takes to be in stage three or four, and how one gets there is treated in a fairly general way in their papers.

Roth and Miller (1989) have attempted to determine whether generic manufacturing strategies exist and what their content is. They performed their analysis on the basis of the North American Manufacturing Futures Survey database. In this paper we intend to use their methodology to explore whether (i) we can derive some generic manufacturing strategies for the European manufacturing companies, (ii) to what extent these strategies are similar to the North American ones, and (iii) whether there is any indication about the success of these generic strategies.

2. Generic Manufacturing Strategies

From the onset of the study of manufacturing strategy practitioners have asked whether one could derive a set of internally coherent or generic manufacturing strategies, which could lead to successful performance. The existence of generic strategies, as proposed by Porter (1980) for the general business strategy of the firm has been doubted by some, and in particular scholars have developed an alternative view on the existence of across industry generic strategies (Dierickx and Cool, 1989). On the other hand Van Lommel and De Brabander (1983) or Jacquemin et al (1980) have shown that industry classifications do not matter in order to describe a company's performance, and that only the intrinsic characteristics and strategy of the firm can explain performance.

The manufacturing community has always more or less accepted the existence of differentiated manufacturing strategies. One of the many contributions made by Skinner (1969) is the idea of manufacturing missions. He asserts that companies can pursue different types of manufacturing missions such as quality, cost efficiency, flexibility or dependability. Although these missions are not mutually exclusive, Skinner indicated that a company cannot pursue these different missions with equal vigour in the same factory and that the company will have to choose with which priority and with which emphasis the different missions will be implemented. Miller (1983) proposed a set of seven missions, and argues basically the same case for making trade-offs. Consequently one could derive from this line of thought that in manufacturing, these different

missions could be the nucleus of generic manufacturing strategies: low cost manufacturing, high quality manufacturing, highly flexible manufacturing and highly dependable manufacturing.

The need to make trade-offs has come under some attack over the last decade. Practice has shown that some companies have pursued successfully combinations of these missions. It is generally accepted these days that low cost manufacturing and high quality manufacturing do not have to exclude each other, and that in contrast pursuing high quality is the basis for the creation of other strengths such as low costs or dependability (Ferdows et al, 1989). De Meyer et al (1989) have suggested that in addition in most recent years the combination of low cost and high flexibility manufacturing is vigorously developed by some of the world's excellent manufacturing companies.

A different approach to determining generic manufacturing strategies is based on the idea of technological life-cycles as proposed by Utterback and Abernathy (1975) and Abernathy (1978). Simplifying, one can say that this work leads to two types of approaches in manufacturing: one based on creating flexibility (in the earlier stages of the technological life-cycle), and one based on creating efficiency in the later stages of the technological life-cycle. Hill's (1985) life-cycle planning sees a shift from product to process to product focus in the plant design, which is somewhat similar to ideas of a technological life-cycle.

A third contribution to the determination of generic manufacturing strategies was made by Stobaugh and Telesio (1983) who derived on the basis of a review of 100 case studies, three groups of international manufacturers: cost, technology and market driven strategy groups.

Except for the last study most of the studies of manufacturing strategies were based on small sample case-based research. Roth and Miller (1989) have used the data collected in 1987 in the context of the American Manufacturing Futures project to empirically determine a taxonomy of manufacturing strategies, and this on a sample of 188 North-American companies. They follow Cool and Schendel's assertion (1987) that to determine strategic groups at the business level one should use two sets of elements: scope of the business and resource commitments.

In order to cluster the respondents' manufacturing strategies Roth and Miller used competitive priorities in manufacturing for the next five years, as expressed by senior manufacturing managers, as an operationalisation of scope. The relative emphasis placed on manufacturing action plans were used as an operationalisation of resource commitments. In their results they distinguish three groups, which they call caretakers, marketeers and innovators. Caretakers tend to compete on price and place relatively low emphasis on modern production improvement methods.

Marketeers seek to obtain broader distribution, to offer broader product lines, and to be responsive to changing volume requirements. These marketeers plan on strengthening their manufacturing operations through infra-structural changes, such as worker motivation programmes, job enlargement and enrichment, and intend to attack quality problems.

Innovators place emphasis on their ability to make quick changes in the product design, and focus as well on providing high performance products. To carry out their strategic orientations, the innovators' manufacturing strategy places more emphasis on CAD and developing new processes for new products. Roth and Miller found that though the taxonomy they propose is influenced by industry, it is not dominated by it, and applies to a broad number of competitive circumstances.

This work has the merit of proposing a method to determine generic manufacturing strategies in the framework suggested by Cool and Schendel. The groups they have derived coincide to a large extent with the groups proposed by Stobaugh and Telesio. But there is no guarantee or verification that the groups which they have determined are not the consequence of a bias in their sample, or of the particular economical situation of the year during which they have collected data. To check for some of these potential biases we propose to use their methodology and apply it to two sets of data collected through a similar survey administered in Europe.

3. Methods and Sample

The data for this study were obtained from the European Manufacturing Futures Survey (Ferdows and De Meyer, 1988; and De Meyer

and Ferdows,1990), (1). The questionnaire which is used to collect the data has three sections which are relevant to this analysis. The first set relates to the competitive priorities or capabilities which the respondents think will be important over the next five years to compete in their industry. The importance measures indicate the relative importance (on a seven point scale) attributed to each capability that the manufacturing firm chooses to emphasize in appealing to customers and competing in the market place. The nine capabilities are similar to those suggested by Buffa (1984), Skinner (1969, 1985) and Hayes and Wheelwright (1984), (see table 1).

The second set of data are demographic data about the business unit, such as investments in R&D, growth rates, profitability, etc. The third set of data are a closed list of 37 action plans (table 2). In both 1987 and 1988 we asked companies what was the relative emphasis that they had placed in the last year and would place on each of these action plans in the coming five years. The set of action plans is obviously non-exhaustive, but is the result of brainstorming by the researchers involved in the project. As such it is probably a satisfactory closed list of potential action programmes in manufacturing. The participants could indicate their relative priorities of emphasis for past and future action programmes in 1987 and future action programmes in 1988 on a seven point self-anchoring scale, where 1 indicates no importance and 7 indicates critically important. For the past action programmes for 1988, the respondent was simply asked to indicate whether or not a significant emphasis had been placed on the particular action programme.

Insert Table 1 about here

Insert Table 2 about here

Roth and Miller have proposed to use the competitive priorities to cluster the respondents in a limited number of groups. To interpret the groups, they use cluster results plus the differences in emphasis between the groups placed on the action programmes. In Cool and Schendel's

framework the scope of the business unit is thus used to do the initial clustering, while the scope and resource commitments are used to interpret the cluster results. This method assumes thus a certain hierarchy between scope and resource commitments. Although this is not completely in agreement with the strategic framework Roth and Miller have adopted, it follows the traditional Skinner framework that argues that the relation between manufacturing policies (i.e. the action plans) and the business strategy is a hierarchical one, with the manufacturing missions (i.e. the competitive priorities) as intervening variables (Skinner, 1969).

The European sample consists of 225 observations in 1987, of which 211 were used, and of 184 observations in 1988 of which 176 were used. Some of the questionnaires were excluded because of largely incomplete data. The original panel to whom the questionnaire was sent, consisted of the 100 largest companies in each of the four major European industrial countries and the 50 largest manufacturing companies in the other European countries.

The samples are definitely not representative for the European industry as a whole. They are not biased either towards industries or to particular countries. As such they provide an interesting cross-section of European industry. The sample is however biased towards large companies, and towards the more profitable ones (De Meyer and Ferdows, 1990). If we assume that manufacturing makes a difference to the performance of a company, this implies that the generic strategies we eventually will derive, form perhaps an incomplete set. Our subset is indeed biased towards the more successful manufacturing strategies.

The method used to determine the clusters was the SAS Fastclus procedure applied to a pooled within-cluster covariance matrix determined through SAS AceCLUS. The differences between groups were tested on the competitive priorities with a Scheffe test. The reader can consult Roth and Miller (1989) for more details on the particular part of the statistical analysis. We used however more strict significance limits than they did. The significance of the differences in action plans and demographic data between the groups was tested with an ANOVA procedure, followed by a Tukey range test.

4. Identifying the Generic Strategies

4.1. Clustering

Clustering requires the researcher to determine the number of clusters. To keep comparability with the North American results, a similar set of criteria was used to determine the optimal number of clusters. Three types of criteria were used:

(1) Lehmann's suggestion to keep the number of clusters between n/30 and n/60 where n is the sample size.

(2) pronounced increases in the tightness of the clusters as measured by the pseudo F-statistic.

(3) managerial interpretability of the clusters on the basis of the differences between the centroids. In that way we obtain for both 1987 and 1988 three clusters. The resultant clusters are described in table 3.

Insert Table 3 about here

If we take a conservative attitude and keep the 1% level of significance as a criterion, then neither low prices, nor volume flexibility contribute to an overall separation of the clusters. In 1988 conformance, speed of delivery and speed of production changes have no separating power either.

To make a first effort to interpret the three clusters we will use the differences between the clusters as measured by a Scheffe-test, as well as the absolute ranking of the competitive priorities in each group. The differences between the three clusters in 1987 on the basis of a Scheffe-test (5% significance level) can be summarised as follows:

(a) Companies in cluster 1 score on the average significantly higher than cluster 3 on conformance, delivery dependability and broad product line. They score significantly lower than cluster 3 on performance.

(b) Cluster 2 scores significantly higher than Cluster 1 on speed of new product development and broad product line. It also scores significantly higher than cluster 3 on conformance and delivery speed.
(c) In absolute terms cluster 1 puts conformance, delivery dependability, delivery speed and speed of production changes on top, while performance is the lowest competitive priority.
(d) Cluster 2 puts conformance, performance, delivery dependability and delivery speed high on the list. Low prices comes only at the eighth place in the rank order.
(e) Cluster 3 puts conformance and performance on top, as well as speed of production plan changes and speed of delivery.

It appears that the second cluster is relatively more responsive and reliable. Although speed of new product development is not high on its list, it scores significantly higher than for the other clusters. The first cluster emphasizes consistency in quality and delivery, but clearly not performance. The third cluster is performance oriented, and emphasizes, in absolute terms, speed of delivery and adaptation to the customers' requests. Although quality conformance is high on the list, this cluster scores significantly lower on this competitive priority than the other clusters.

When we compare these findings with the results of the North American survey, then we can detect some similarity between cluster 2 and what Roth and Miller call the innovators. It is however difficult to assimilate clusters 1 and 3 with the caretakers, or with the marketeers.

The same analysis on the 1988 data leads to the following conclusions:

(a) Companies in cluster 1 score significantly higher than companies in cluster 2 on speed of production plan changes, but they score lower than cluster 2 on performance.
(b) Cluster 1 scores higher than cluster 3 on speed of new product development, volume flexibility and delivery speed. But the companies in cluster 1 score lower on performance and delivery dependability.
(c) Cluster 2 scores higher than cluster 3 on speed of new product development, performance delivery speed and broad product line.

(d) In absolute terms cluster 1 emerges in the 1988 data as one where performance is not so important, but where conformance, and in particular speed is very important. Speed of delivery, speed of production plan changes and speed of new product development indeed score high. Although for new product development this is only on a comparative basis with other clusters, not on an absolute basis.

(e) Cluster 2, which is again the largest group, scores high on conformance, performance, delivery dependability, and in comparison with cluster 3, on speed of new product development.

(f) The third cluster stand out by its similarity with the second cluster, except for the very low emphasis on speed of new product development.

The comparison with the U.S. results does not become easier. While cluster 2, which forms the biggest group, can with some goodwill be identified with the U.S. group of innovators, it becomes more difficult to see a lot of commonality between the two other European clusters and the group of caretakers and marketeers. One of the reasons for this is that in the European sample the emphasis on low prices as a competitive priority seems to be low all the time, and does not have any power to distinguish between the groups.

The comparison between the two clusterings in Europe shows a high stability. The items about which the groups differ significantly change somewhat, but the general picture remains unchanged. Speed of new product development, performance, delivery speed and broad product line have in both cases separating power. The most important difference is that conformance has separating power in 1987, but not in 1988. Apart from some insignificant switches, the rank order of the competitive priorities remains unchanged (2). The two clusters 1 stand out by a low emphasis on performance, and a high emphasis on conformance and speed. The two clusters 2 have both the largest "membership" and have an identical ranking of the competitive priorities, except for broad product line. They seem to emphasize quality both in consistency, performance and dependability. And compared to the others they put relatively more emphasis on the speed with which new products are developed. The third cluster stands out by its emphasis on performance.

Here we see from 1987 to 1988 a strong increase in the emphasis on delivery dependability. Discounting for some noise due to the fact that we have two unidentical samples, one finds a high stability in the clustering. If we had found the opposite result, we would have had some doubts about the instrument used, because one can safely assume that manufacturing strategies do not change dramatically from one year to another. The irreversibility of some of the investments in manufacturing are one of the reasons why one would expect this stability. That does not mean of course that an individual company or business unit could not review its manufacturing strategy, but one would not expect drastic changes for a large group of companies given the relative stability of the external environment in 1987-1988.

4.2 Further analysis of the clusters

In order to better understand the characteristics of the clusters we will now analyse how the three groups, which were derived for the 1987 and 1988 samples, allocate their management efforts. An Anova was used to find the action variables which were significantly influenced by the categorisation into clusters, and a Tukey range test was then used to find the pairwise difference between the individual clusters. For the 1988 past action variables a chi-square test was used. The results of these tests are summarised in table 4.

Insert Table 4 about here

In 1987 cluster 1 turns out to be a cluster which scores lower on a wide range of items than either one or both of the other clusters, except for the current market share. With respect to action plans they have some common characteristics with Roth and Millers's caretakers. They seem to defend a market share with means other than an aggressive manufacturing strategy. In terms of manufacturing they seem to simply rely on their dependability. They seem to invest less, comparativley speaking, in modern production systems or techniques.

The second and third clusters are more pronounced with respect to their manufacturing efforts. Compared with cluster 1, cluster 2 seems to have applied the newest ideas in operations management. They give more planning responsibility to their workers, they pursue zero defects and improved vendor quality, reduction of manufacturing and vendor lead times, have emphasized more strongly the capability of introducing new products, have developed more new processes for new products, and have invested more heavily in CAD, CAM, JIT, FMS and robots.

Comparing cluster 2 with cluster 3, the list is less long: a higher emphasis on worker safety, manufacturing lead time reduction and reconditioning of physical plants. The third cluster emphasizes more than the first cluster the investments in CAD, FMS, and invests more in R&D as a % of sales and envisions a higher growth in the proportion of new products to be introduced in the market as compared to previous years.

These differences in past action programmes are confirmed, though somewhat less pronounced, in the future action programmes. Cluster 2 emphasizes manufacturing and vendor lead time reduction more than cluster 1, and adds to the emphasis on worker safety and reconditioning of physical plants a higher emphasis on JIT and vendor quality, in comparison to cluster 3. Cluster 3 tends to emphasize FMS more than cluster 1.

For the 96 respondents that answered both in 1987 and 1988, we checked whether the differences in clusters had some impact on performance in 1988 or on the type of resource commitments, i.e. action plans pursued. The only performance indicator which was significantly influenced by the clustering was growth: the companies in cluster 3 had a significantly higher growth than the companies in clusters 1 or 2. Cluster 3 invested in 1988 more in R&D as a % of sales than the two other clusters, intended to more heavily emphasize robots in the future, than cluster 1, while cluster 1 had put more emphasis on manufacturing reorganisation.

We propose the following summary out of all this. The first cluster of 37 companies emphasizes a manufacturing scope of dependability and serving the market. Starting with a larger market share, they emphasize less creative development in manufacturing, and have emphasized one year later the reorganisation of their manufacturing. Cluster 2 is a cluster of

innovative manufacturers and are similar to the innovators in the U.S. sample. The size of this group seems to be high, but this can perhaps be explained by the fact that a voluntary questionnaire probably introduces a bias towards the more innovative manufacturers. Cluster 3 emphasizes product performance as its scope, and is on many action plans somewhere in between clusters 1 and 2. It clearly emphasizes more than cluster 1 the use of FMS, CAD, etc, and invests more in R&D. They seem to be more technology driven. Although we found very few differences in performance in general, this group seems to grow faster than the others.

Let us now turn to the 1988 sample. In terms of past action plans there were few differences: cluster 3 scores higher than cluster 1 on reconditioning of physical plants. However, the differences we observed for the action plans in 1987 are confirmed in the future action plans in 1988. The large cluster 2 scores higher in emphasis than cluster 1 on value analysis and product redesign, worker safety, integration of information systems across functions and reconditioning of physical plants. Cluster 3 scores higher in emphasis on worker safety than cluster 1. Cluster 2 scores higher than cluster 3 on CAD, plant relocation and integration of information systems across functions. Again it seems that the second cluster is more active in manufacturing terms. The first cluster is putting less emphasis on manufacturing programmes than the other clusters. Cluster 3 is again somewhere in between clusters 1 and 2.

5. Discussion

The analysis has allowed us to derive three meaningful clusters. The present analysis supports the approach proposed by Roth and Miller. As with the North American analysis, we were able to determine three clusters. These clusters show a high stability from one year to another, even though the two samples are not completely identical.

Labeling clusters is always somewhat arbitrary, but on the basis of the analysis we would propose the following. The second cluster, which is also the biggest in both 1987 and 1988, can be called manufacturing innovators. Both in competitive priorities and action plans they seem to strive for what others have called worldclass manufacturing (Schonberger,1983). Our analysis does not enable us to say whether or not

they are worldclass manufacturers. It simply shows that relatively speaking they pay more attention to priorities and action plans which are usually identified with worldclass manufacturing.

The third cluster is a group of focused manufacturers which emphasize performance of their products. They seem to be a bit more oriented towards the deployment of technology in their emphasis on CAD, FMS, and strive for a good production process characterised by worker safety. The difference with the second cluster is however not so large. Let us label this group the high performance products group.

The first cluster seems to be a cluster where manufacturing is relatively speaking not so much the key to the competitive strategy. In terms of priorities, conformance and speed of reaction to customers' demand are emphasized (in absolute terms, although not more than the other clusters in relative terms). But the resource commitments in manufacturing, measured as the emphasis on action plans, is lower than in the other groups and this across the board. Given that their market share is bigger than that of other groups, one could hypothesize that these manufacturers are more marketing oriented in their strategy. This is confirmed by their competitive priorities which emphasize a better service to the customer (such as consistent quality, speed of delivery, etc). Let us call them the marketing oriented group.

One of our objectives was to check whether the North American clustering would be robust. To a certain extent the "manufacturing innovators" coincide with the North American "innovators". The marketing oriented group has quite a number of analogies with the North American "caretakers", but have in their priorities something of the "marketeers". Consequently we would not be so negative about them as Roth and Miller are about the caretakers. Our last group is one that does not appear in the North American analysis. It is a group pursuing top performing products. Some of the companies in this group stand for high performance products, for which some European manufacturers are well-known. It is perhaps a more pronounced European strategy.

These differences between the European and North American results raise the issue of whether we can really talk about generic manufacturing

strategies, and if they are generic manufacturing strategies, how many of them do exist? With the exception of the European high performance product group and the North American caretaker group, none of the clusters which are derived can be easily identified with the typical strategies which were proposed earlier. The caretakers are perhaps low cost producers, and the high performance product group are perhaps high quality producers, but manufacturing innovators, marketeers or marketing oriented groups do not really coincide with any of the strategies proposed. In the life-cycle model of Hill (1985) or Abernathy (1987), marketeers could perhaps be identified with process oriented manufacturers. In that case one would expect them to place high emphasis on process improvements, which we do not observe. And, although one would not expect the largest cluster (of large companies) to be at the begining of a technological life-cycle, innovators could be identified with companies in the beginning of the technological life-cycle. In that case we would expect them to put emphasis on flexibility. We can partially observe this in the data.

The difference between Europe and North America is of course intriguing. If one accepts the convergence hypothesis, i.e. that management concepts, strategies and approaches in different industrial regions would evolve towards each other if the external conditions became more similar, then Europe and North America would be expected to have similar, if not identical, generic strategies. The convergence hypothesis has been under attack, especially since the more careful study of Asian and in particular Japanese management approaches. Perhaps our findings contribute some empirical support for rejecting the convergence hypothesis.

We would cautiously suggest that indeed both this study and North American findings suggest the existence of generic manufacturing strategies. However, we suspect that even if we merge the results of the two studies the list of four approaches (innovators, caretakers, high performance product suppliers, marketeers) is not exhaustive.

Finally, there seems to be little or no relation in our study between the classification into groups and performance. Except for a higher growth for the high performance products group in comparison with the marketing oriented group, there was no significant difference for a set of more than 15

performance indicators (going from more general performance indicators such as profit, growth etc, to more manufacturing specific indicators such as inventory reduction, quality improvement, etc). None of the three strategies we determined on the basis of the European sample seems to be superior either in the short or medium term.

6. Conclusion

Manufacturing strategy has received increased attention over the last decade. Many papers about the components of manufacturing or the trade-offs to be made in manufacturing have been published, but few empirical studies exist which attempt to determine some typical manufacturing strategies. Following a similar North American study we derived on the basis of two European samples three typical manufacturing strategies;

- focused on high performance products
- based on manufacturing innovativeness
- marketing oriented

Some similarity with the North American results exists,but there are also clear distinctions. Further empirical studies seem to be needed to determine whether generic manufacturing strategies exist, and if so what a complete set of generic manufacturing strategies would be.

Notes

(1) The European Manufacturing Futures Project is part of a larger project, the Global Manufacturing Futures Project, initiated by J.G. Miller at Boston University, and carried out in Europe in collaboration with INSEAD, Fontainebleau, (K. Ferdows and A. De Meyer) and in Japan at Waseda University, Tokyo (J. Nakane).

(2) A non-parametric test was carried out to test the significance of the ranking. This test is omitted here since it would only further complicate the results; and would not contribute to the interpretation. We have paid attention only to the extremes of the list.

Bibiliography

Abernathy W.J., The Productivity Dilemma, J Hopkins University Press, Baltimore, 1978

Buffa E.S., Meeting the Competitive Challenge, Dow Jones-Irwin, New York, 1984

Cool K. and D. Schendel, Strategic Group Formation and Performance: The Case of the U.S. Pharmaceutical Industry, 1963-1982, Management Science, no.9, pp.1102-1124, 1987

De Meyer A. and K. Ferdows, Managerial Focal Points in Manufacturing Strategy, International Journal of Production Research, vol.25, no.11, pp 1152-1162, 1987

De Meyer A., J. Nakane, J.G. Miller, and K. Ferdows, Flexibility: The Next Competitive Battle, Strategic Management Journal, vol.10, no.2, pp 135-144, 1989

De Meyer A. and K. Ferdows, Quality Up, Technology Down, to appear in International Journal of Technology Management, 1990

Derouzos M.L., R.K. Lester, R.M. Solow, Made in America, Regaining the Productive Edge, M.I.T. Press, Cambridge, MA., 1989

Dierickx I. and K. Cool, Competitive Strategy, Asset Accumulation and Firm Performance, INSEAD Working Paper, June 1989

Ferdows K. and A. De Meyer, European Manufacturers: The Dangers of Complacency, The Columbia Journal of World Business, vol.33, no.3, pp 15-24, 1988

Ferdows K. and A. De Meyer, Lasting Improvement in Manufacturing Performance: In Search of a New Theory, INSEAD Working Paper 89/04, 1989

Hayes R.H., S.C. Wheelwright, Restoring Our Competitive Edge: Competing Through Manufacturing, Wiley and Sons, New York, 1984

Hayes R.H., S.C. Wheelwright, K.B. Clark, Dynamic Manufacturing, Creating the Learning Organisation, The Free Press, New York, 1988

Hill T.J., Manufacturing Strategy: The Strategic Management of the Manufacturing Function, Macmillan, London, 1985

Jacquemin A.P., E. de Ghellinck and C. Huveneers, Concentration in a Small Open Economy, Journal of Industrial Economics, vol.29, no.2, 1980

Miller S.S., Make Your Plant Managers Job Manageable, Harvard Business Review, January-February, 1983

Porter M., Competitive Strategy, The Free Press, New York, 1980

Roth A.V. and J.G. Miller, A Taxonomy of Manufacturing Strategies, Paper presented at the ninth Conference of the Strategic Management Society, San Francisco, October, 1989

Schmenner R.W., Look Beyond the Obvious in Plant Location, Harvard Business Review, January-February, 1979

Schmenner R.W., Making Business Location Decisions, Prentice Hall, Englewood Cliffs, NJ, 1982

Schonberger R.J., Worldclass Manufacturing: The Lessons of Simplicity Applied, The Free Press, New York, 1986

Skinner W., Production Under Pressure, Harvard Business Review, November-December 1966

Skinner W., Manufacturing - The Missing Link in Manufacturing Strategy, Harvard Business Review, September-October, 1969

Skinner W., The Focused Factory, Harvard Business Review, May-June, pp 113-121, 1974

Skinner W., Manufacturing in the Corporate Strategy, Wiley, New York, 1978

Stobaugh R. and P. Telesio, Match Manufacturing Policies and Product Strategy, Harvard Business Review, March-April, 1983

Utterback J. and W.J. Abernathy, A Dynamic Model of Process and Product Innovation, Omega, vol.3, no.6, pp 639-656, 1975

Wheelwright S.C., Reflecting Corporate Strategy in Manufacturing Decisions, Business Horizons, February, 1978

Wheelwright S.C., Japan - Where Operations are Really Strategic, Harvard Business Review, July-August, 1981

Van Lommel E. and B. De Brabander, Conjunctuurgevoeligheid van de marktstructurele technologische en operationele determinanten van de Financiele Structuur en -resultaten in de Belgische Industrie, in Competitief Ondernemen, Kluwer, 1983

TABLE 1	
mnemonic name	capability as proposed in questionnaire
low prices	ability to offer low prices
new product development speed	ability to make rapid design changes and/or introduce new products quickly
volume flexibility	ability to change volume rapidly
conformance	ability to offer consistent quality
performance	ability to provide high performance products
delivery speed	ability to deliver products quickly
delivery dependability	ability to deliver on time
broad product line	ability to deliver a broad product line
speed of production changes	ability to change production plans quickly

TABLE 2

Programmes / Activities

Giving Workers a Broad Range of Tasks (job enlargement)

Giving Workers More Planning Responsibility (job enrichment)

Changing Labour / Management Relationships

Manufacturing Reorganisation

Worker Safety

Worker Training

Management Training

Supervisor Training

Preventive Maintenance

Zero Defects

Manufacturing Lead-Time Reduction

Vendor Lead-Time Reduction

Computer-Aided Manufacturing

Computer-Aided Design

Reducing Setup / Changeover Time

Value Analysis / Product Redesign

Group Technology

Capacity Expansion

Reducing Size of Manufacturing Units

Plant Relocation

Developing New Processes for New Products

Developing New Processes for Old Products

Narrowing Product Lines / Standardising

Defining a Manufacturing Strategy

TABLE 2 (CONT.)
Integrating Information Systems Between Manufacturing and Other Functions
Integrating Information Systems Within Manufacturing
Reconditioning of Physical Plants
Just-In-Time
Robots
Flexible Manufacturing Systems
Closing Plants
Statistical Quality Control (process)
Statistical Quality Control (product)
Improving New Product Introduction Capability
Quality Circles
Automating Jobs
Production / Inventory Control Systems
Reducing the Size of Manufacturing Workforce (including hourly and salaried)

TABLE 3

Group centroids of the groups
(competitive abilities) (1)

Competitive ability	group 1		group 2		group3		F-val
1987	n=37		n=132		n=42		
	mean	rank	mean	rank	mean	rank	
low prices	5.1	5.	5.0	8	4.9	5	0.37
new pro dev speed	4.5	6	5.4	5	4.8	6	4.79 **
volume flexibility	4.1	8	4.7	9	4.6	7	1.99
conformance	6.6	1	6.6	1	5.9	2	15.87 ***
performance	3.5	9	6.3	2	6.1	1	134.33 ***
delivery speed	5.5	3	5.7	4	5.0	4	5.07 **
delivery dependability	5.7	2	6.1	3	4.6	8	29.31 ***
broad product line	4.4	7	5.3	6	3.2	9	40.33 **
speed of prod change	5.3	4	5.1	7	5.3	3	0.44
1988	n=35		n=114		n=27		
low prices	5.1	7	5.0	7	4.7	6	0.45
new prod dev speed	5.3	6	5.6	5	3.7	9	22.34 ***
volume flexibility	5.5	5	4.8	9	4.4	7	3.68 *
conformance	6.4	1	6.4	1	6.4	1	0.97
performance	3.8	9	6.2	2	5.7	3	75.98 ***
delivery speed	6.1	2	6.0	4	4.7	5	26.76 ***
delivery dependability	5.7	4	6.0	3	6.4	2	3.96 *
broad product line	4.4	8	5.0	8	4.1	8	5.22 **
speed of prod changes	5.8	3	5.1	6	5.1	4	4.19 *

(1) means give mean centroid (on a scale from 1 to 7); rank gives ranking for the competitive priorities of groups

* $p<.05$

** $p<.01$

*** $p<.001$

TABLE 4

Comparison of emphasis on action plans
and business unit characteristics

Clusters compared	1987	1988
Past action plans & business unit characteristics		
1>2	none	none
1>3	current market share	none
2>1	give workers more planning responsability zero defects mfg. lead time reduction vendor lead time reduction CAM and CAD developing new processes for new products JIT FMS introduction of robots improving new product introduction capabilities vendor quality	none
2>3	worker safety mfg. lead time reduction reconditioning physical plants	none
3>1	CAD FMS past proportion of new products as % of sales R&D spending as % of sales	reconditioning physical plant
Future action plans		
1>2	none	none
1>3	none	none
2>1	mfg. lead time reduction vendor lead time reduction FMS JIT	value analysis & product redesign worker safety integration of information systems across functions reconditioning physical plant
2>3	worker safety reconditioning physical plant JIT vendor quality	CAD plant relocation integration of information systems across functions
3>1	FMS	worker safety
3>2	none	none

INSEAD WORKING PAPERS SERIES

1986

86/01	Arnoud DE MEYER	"The R & D/Production interface".
86/02	Philippe A. NAERT Marcel WEVERBERGH and Guido VERSWIJVEL	"Subjective estimation in integrating communication budget and allocation decisions: a case study", January 1986.
86/03	Michael BRIMM	"Sponsorship and the diffusion of organizational innovation: a preliminary view".
86/04	Spyros MAKRIDAKIS and Michèle HIBON	"Confidence intervals: an empirical investigation for the series in the M-Competition" .
86/05	Charles A. WYPLOSZ	"A note on the reduction of the workweek", July 1985.
86/06	Francesco GIAVAZZI, Jeff R. SHEEN and Charles A. WYPLOSZ	"The real exchange rate and the fiscal aspects of a natural resource discovery", Revised version: February 1986.
86/07	Douglas L. MacLACHLAN and Spyros MAKRIDAKIS	"Judgmental biases in sales forecasting", February 1986.
86/08	José de la TORRE and David H. NECKAR	"Forecasting political risks for international operations", Second Draft: March 3, 1986.
86/09	Philippe C. HASPESLAGH	"Conceptualizing the strategic process in diversified firms: the role and nature of the corporate influence process", February 1986.
86/10	R. MOENART, Arnoud DE MEYER, J. BARBE and D. DESCHOOLMEESTER.	"Analysing the issues concerning technological de-maturity".
86/11	Philippe A. NAERT and Alain BULTEZ	"From "Lydiametry" to "Pinkhamization": misspecifying advertising dynamics rarely affects profitability".
86/12	Roger BETANCOURT and David GAUTSCHI	"The economics of retail firms", Revised April 1986.
86/13	S.P. ANDERSON and Damien J. NEVEN	"Spatial competition à la Cournot".
86/14	Charles WALDMAN	"Comparaison internationale des marges brutes du commerce", June 1985.
86/15	Mihkel TOMBAK and Arnoud DE MEYER	"How the managerial attitudes of firms with FMS differ from other manufacturing firms: survey results", June 1986.
86/16	B. Espen ECKBO and Herwig M. LANGOHR	"Les primes des offres publiques, la note d'information et le marché des transferts de contrôle des sociétés".
86/17	David B. JEMISON	"Strategic capability transfer in acquisition integration", May 1986.
86/18	James TEBOUL and V. MALLERET	"Towards an operational definition of services", 1986.
86/19	Rob R. WEITZ	"Nostradamus: a knowledge-based forecasting advisor".
86/20	Albert CORHAY, Gabriel HAWAWINI and Pierre A. MICHEL	"The pricing of equity on the London stock exchange: seasonality and size premium", June 1986.
86/21	Albert CORHAY, Gabriel A. HAWAWINI and Pierre A. MICHEL	"Risk-premia seasonality in U.S. and European equity markets", February 1986.
86/22	Albert CORHAY, Gabriel A. HAWAWINI and Pierre A. MICHEL	"Seasonality in the risk-return relationships some international evidence", July 1986.
86/23	Arnoud DE MEYER	"An exploratory study on the integration of information systems in manufacturing", July 1986.
86/24	David GAUTSCHI and Vithala R. RAO	"A methodology for specification and aggregation in product concept testing", July 1986.
86/25	H. Peter GRAY and Ingo WALTER	"Protection", August 1986.
86/26	Barry EICHENGREEN and Charles WYPLOSZ	"The economic consequences of the Franc Poincare", September 1986.
86/27	Karel COOL and Ingemar DIERICKX	"Negative risk-return relationships in business strategy: paradox or truism?", October 1986.
86/28	Manfred KETS DE VRIES and Danny MILLER	"Interpreting organizational texts.
86/29	Manfred KETS DE VRIES	"Why follow the leader?".
86/30	Manfred KETS DE VRIES	"The succession game: the real story.
86/31	Arnoud DE MEYER	"Flexibility: the next competitive battle", October 1986.
86/31	Arnoud DE MEYER, Jinichiro NAKANE, Jeffrey G. MILLER and Kasra FERDOWS	"Flexibility: the next competitive battle", Revised Version: March 1987
86/32	Karel COOL and Dan SCHENDEL	Performance differences among strategic group members", October 1986.

86/33	Ernst BALTENSPERGER and Jean DERMINE	"The role of public policy in insuring financial stability: a cross-country, comparative perspective", August 1986, Revised November 1986.
86/34	Philippe HASPESLAGH and David JEMISON	"Acquisitions: myths and reality", July 1986.
86/35	Jean DERMINE	"Measuring the market value of a bank, a primer", November 1986.
86/36	Albert CORHAY and Gabriel HAWAWINI	"Seasonality in the risk-return relationship: some international evidence", July 1986.
86/37	David GAUTSCHI and Roger BETANCOURT	"The evolution of retailing: a suggested economic interpretation".
86/38	Gabriel HAWAWINI	"Financial innovation and recent developments in the French capital markets", Updated: September 1986.
86/39	Gabriel HAWAWINI Pierre MICHEL and Albert CORHAY	"The pricing of common stocks on the Brussels stock exchange: a re-examination of the evidence", November 1986.
86/40	Charles WYPLOSZ	"Capital flows liberalization and the EMS, a French perspective", December 1986.
86/41	Kasra FERDOWS and Wickham SKINNER	"Manufacturing in a new perspective", July 1986.
86/42	Kasra FERDOWS and Per LINDBERG	"FMS as indicator of manufacturing strategy", December 1986.
86/43	Damien NEVEN	"On the existence of equilibrium in hotelling's model", November 1986.
86/44	Ingemar DIERICKX Carmen MATUTES and Damien NEVEN	"Value added tax and competition", December 1986.

1987

87/01	Manfred KETS DE VRIES	"Prisoners of leadership".
87/02	Claude VIALLET	"An empirical investigation of international asset pricing", November 1986.
87/03	David GAUTSCHI and Vithala RAO	"A methodology for specification and aggregation in product concept testing", Revised Version: January 1987.
87/04	Sumantra GHOSHAL and Christopher BARTLETT	"Organizing for innovations: case of the multinational corporation", February 1987.
87/05	Arnoud DE MEYER and Kasra FERDOWS	"Managerial focal points in manufacturing strategy", February 1987.
87/06	Arun K. JAIN, Christian PINSON and Naresh K. MALHOTRA	"Customer loyalty as a construct in the marketing of banking services", July 1986.
87/07	Rolf BANZ and Gabriel HAWAWINI	"Equity pricing and stock market anomalies", February 1987.
87/08	Manfred KETS DE VRIES	"Leaders who can't manage", February 1987.
87/09	Lister VICKERY, Mark PILKINGTON and Paul READ	"Entrepreneurial activities of European MBAs", March 1987.
87/10	André LAURENT	"A cultural view of organizational change", March 1987
87/11	Robert FILDES and Spyros MAKRIDAKIS	"Forecasting and loss functions", March 1987.
87/12	Fernando BARTOLOME and André LAURENT	"The Janus Head: learning from the superior and subordinate faces of the manager's job", April 1987.
87/13	Sumantra GHOSHAL and Nitin NOHRIA	"Multinational corporations as differentiated networks", April 1987.
87/14	Landis GABEL	"Product Standards and Competitive Strategy: An Analysis of the Principles", May 1987.
87/15	Spyros MAKRIDAKIS	"METAFORECASTING: Ways of improving Forecasting. Accuracy and Usefulness", May 1987.
87/16	Susan SCHNEIDER and Roger DUNBAR	"Takeover attempts: what does the language tell us?, June 1987.
87/17	André LAURENT and Fernando BARTOLOME	"Managers' cognitive maps for upward and downward relationships", June 1987.
87/18	Reinhard ANGELMAR and Christoph LIEBSCHER	"Patents and the European biotechnology lag: a study of large European pharmaceutical firms", June 1987.
87/19	David BEGG and Charles WYPLOSZ	"Why the EMS? Dynamic games and the equilibrium policy regime, May 1987.
87/20	Spyros MAKRIDAKIS	"A new approach to statistical forecasting", June 1987.
87/21	Susan SCHNEIDER	"Strategy formulation: the impact of national culture", Revised: July 1987.
87/22	Susan SCHNEIDER	"Conflicting ideologies: structural and motivational consequences", August 1987.
87/23	Roger BETANCOURT David GAUTSCHI	"The demand for retail products and the household production model: new views on complementarity and substitutability".

87/24	C.B. DERR and André LAURENT	"The internal and external careers: a theoretical and cross-cultural perspective", Spring 1987.
87/25	A. K. JAIN, N. K. MALHOTRA and Christian PINSON	"The robustness of MDS configurations in the face of incomplete data", March 1987, Revised: July 1987.
87/26	Roger BETANCOURT and David GAUTSCHI	"Demand complementarities, household production and retail assortments", July 1987.
87/27	Michael BURDA	"Is there a capital shortage in Europe?", August 1987.
87/28	Gabriel HAWAWINI	"Controlling the interest-rate risk of bonds: an introduction to duration analysis and immunization strategies", September 1987.
87/29	Susan SCHNEIDER and Paul SHRIVASTAVA	"Interpreting strategic behavior: basic assumptions themes in organizations", September 1987
87/30	Jonathan HAMILTON W. Bentley MACLEOD and J. F. THISSE	"Spatial competition and the Core", August 1987.
87/31	Martine QUINZII and J. F. THISSE	"On the optimality of central places", September 1987.
87/32	Arnoud DE MEYER	"German, French and British manufacturing strategies less different than one thinks", September 1987.
87/33	Yves DOZ and Amy SHUEN	"A process framework for analyzing cooperation between firms", September 1987.
87/34	Kasra FERDOWS and Arnoud DE MEYER	"European manufacturers: the dangers of complacency. Insights from the 1987 European manufacturing futures survey, October 1987.
87/35	P. J. LEDERER and J. F. THISSE	"Competitive location on networks under discriminatory pricing", September 1987.
87/36	Manfred KETS DE VRIES	"Prisoners of leadership", Revised version October 1987.
87/37	Landis GABEL	"Privatization: its motives and likely consequences", October 1987.
87/38	Susan SCHNEIDER	"Strategy formulation: the impact of national culture", October 1987.
87/39	Manfred KETS DE VRIES	"The dark side of CEO succession", November 1987
87/40	Carmen MATUTES and Pierre REGIBEAU	"Product compatibility and the scope of entry", November 1987
87/41	Gavriel HAWAWINI and Claude VIALLET	"Seasonality, size premium and the relationship between the risk and the return of French common stocks", November 1987
87/42	Damien NEVEN and Jacques-F. THISSE	"Combining horizontal and vertical differentiation: the principle of max-min differentiation", December 1987
87/43	Jean GABSZEWICZ and Jacques-F. THISSE	"Location", December 1987
87/44	Jonathan HAMILTON, Jacques-F. THISSE and Anita WESKAMP	"Spatial discrimination: Bertrand vs. Cournot in a model of location choice", December 1987
87/45	Karel COOL, David JEMISON and Ingemar DIERICKX	"Business strategy, market structure and risk-return relationships: a causal interpretation", December 1987.
87/46	Ingemar DIERICKX and Karel COOL	"Asset stock accumulation and sustainability of competitive advantage", December 1987.

1988

88/01	Michael LAWRENCE and Spyros MAKRIDAKIS	"Factors affecting judgemental forecasts and confidence intervals", January 1988.
88/02	Spyros MAKRIDAKIS	"Predicting recessions and other turning points", January 1988.
88/03	James TEBOUL	"De-industrialize service for quality", January 1988.
88/04	Susan SCHNEIDER	"National vs. corporate culture: implications for human resource management", January 1988.
88/05	Charles WYPLOSZ	"The swinging dollar: is Europe out of step?", January 1988.
88/06	Reinhard ANGELMAR	"Les conflits dans les canaux de distribution", January 1988.
88/07	Ingemar DIERICKX and Karel COOL	"Competitive advantage: a resource based perspective", January 1988.
88/08	Reinhard ANGELMAR and Susan SCHNEIDER	"Issues in the study of organizational cognition", February 1988.
88/09	Bernard SINCLAIR-DESGAGNé	"Price formation and product design through bidding", February 1988.
88/10	Bernard SINCLAIR-DESGAGNé	"The robustness of some standard auction game forms", February 1988.
88/11	Bernard SINCLAIR-DESGAGNé	"When stationary strategies are equilibrium bidding strategy: The single-crossing property", February 1988.

88/12	Spyros MAKRIDAKIS	"Business firms and managers in the 21st century", February 1988
88/13	Manfred KETS DE VRIES	"Alexithymia in organizational life: the organization man revisited", February 1988.
88/14	Alain NOEL	"The interpretation of strategies: a study of the impact of CEOs on the corporation", March 1988.
88/15	Anil DEOLALIKAR and Lars-Hendrik ROLLER	"The production of and returns from industrial innovation: an econometric analysis for a developing country", December 1987.
88/16	Gabriel HAWAWINI	"Market efficiency and equity pricing: international evidence and implications for global investing", March 1988.
88/17	Michael BURDA	"Monopolistic competition, costs of adjustment and the behavior of European employment", September 1987.
88/18	Michael BURDA	"Reflections on "Wait Unemployment" in Europe", November 1987, revised February 1988.
88/19	M.J. LAWRENCE and Spyros MAKRIDAKIS	"Individual bias in judgements of confidence", March 1988.
88/20	Jean DERMINE, Damien NEVEN and J.F. THISSE	"Portfolio selection by mutual funds, an equilibrium model", March 1988.
88/21	James TEBOUL	"De-industrialize service for quality", March 1988 (88/03 Revised).
88/22	Lars-Hendrik RÖLLER	"Proper Quadratic Functions with an Application to AT&T", May 1987 (Revised March 1988).
88/23	Sjur Didrik FLAM and Georges ZACCOUR	"Equilibres de Nash-Cournot dans le marché européen du gaz: un cas où les solutions en boucle ouverte et en feedback coïncident", Mars 1988
88/24	B. Espen ECKBO and Herwig LANGOHR	"Information disclosure, means of payment, and takeover premia. Public and Private tender offers in France", July 1985, Sixth revision, April 1988.
88/25	Everette S. GARDNER and Spyros MAKRIDAKIS	"The future of forecasting", April 1988.
88/26	Sjur Didrik FLAM and Georges ZACCOUR	"Semi-competitive Cournot equilibrium in multistage oligopolies", April 1988.
88/27	Murugappa KRISHNAN Lars-Hendrik RÖLLER	"Entry game with resalable capacity", April 1988.
88/28	Sumantra GHOSHAL and C. A. BARTLETT	"The multinational corporation as a network: perspectives from interorganizational theory", May 1988.
88/29	Naresh K. MALHOTRA, Christian PINSON and Arun K. JAIN	"Consumer cognitive complexity and the dimensionality of multidimensional scaling configurations", May 1988.
88/30	Catherine C. ECKEL and Theo VERMAELEN	"The financial fallout from Chernobyl: risk perceptions and regulatory response", May 1988.
88/31	Sumantra GHOSHAL and Christopher BARTLETT	"Creation, adoption, and diffusion of innovations by subsidiaries of multinational corporations", June 1988.
88/32	Kasra FERDOWS and David SACKRIDER	"International manufacturing: positioning plants for success", June 1988.
88/33	Mihkel M. TOMBAK	"The importance of flexibility in manufacturing", June 1988.
88/34	Mihkel M. TOMBAK	"Flexibility: an important dimension in manufacturing", June 1988.
88/35	Mihkel M. TOMBAK	"A strategic analysis of investment in flexible manufacturing systems", July 1988.
88/36	Vikas TIBREWALA and Bruce BUCHANAN	"A Predictive Test of the NBD Model that Controls for Non-stationarity", June 1988.
88/37	Murugappa KRISHNAN Lars-Hendrik RÖLLER	"Regulating Price-Liability Competition To Improve Welfare", July 1988.
88/38	Manfred KETS DE VRIES	"The Motivating Role of Envy : A Forgotten Factor in Management, April 88.
88/39	Manfred KETS DE VRIES	"The Leader as Mirror : Clinical Reflections", July 1988.
88/40	Josef LAKONISHOK and Theo VERMAELEN	"Anomalous price behavior around repurchase tender offers", August 1988.
88/41	Charles WYPLOSZ	"Assymetry in the EMS: intentional or systemic?", August 1988.
88/42	Paul EVANS	"Organizational development in the transnational enterprise", June 1988.
88/43	B. SINCLAIR-DESGAGNE	"Group decision support systems implement Bayesian rationality", September 1988.
88/44	Essam MAHMOUD and Spyros MAKRIDAKIS	"The state of the art and future directions in combining forecasts", September 1988.
88/45	Robert KORAJCZYK and Claude VIALLET	"An empirical investigation of international asset pricing", November 1986, revised August 1988.
88/46	Yves DOZ and Amy SHUEN	"From intent to outcome: a process framework for partnerships", August 1988.

88/47	Alain BULTEZ, Els GIJSBRECHTS, Philippe NAERT and Piet VANDEN ABEELE	"Asymmetric cannibalism between substitute items listed by retailers", September 1988.
88/48	Michael BURDA	"Reflections on 'Vait unemployment' in Europe, II", April 1988 revised September 1988.
88/49	Nathalie DIERKENS	"Information asymmetry and equity issues", September 1988.
88/50	Rob WEITZ and Arnoud DE MEYER	"Managing expert systems: from inception through updating", October 1987.
88/51	Rob WEITZ	"Technology, work, and the organization: the impact of expert systems", July 1988.
88/52	Susan SCHNEIDER and Reinhard ANGELMAR	"Cognition and organizational analysis: who's minding the store?", September 1988.
88/53	Manfred KETS DE VRIES	"Whatever happened to the philosopher-king: the leader's addiction to pover, September 1988.
88/54	Lars-Hendrik RÖLLER and Mihkel M. TOMBAK	"Strategic choice of flexible production technologies and welfare implications", October 1988
88/55	Peter BOSSAERTS and Pierre HILLION	"Method of moments tests of contingent claims asset pricing models", October 1988.
88/56	Pierre HILLION	"Size-sorted portfolios and the violation of the random walk hypothesis: Additional empirical evidence and implication for tests of asset pricing models", June 1988.
88/57	Wilfried VANHONACKER and Lydia PRICE	"Data transferability: estimating the response effect of future events based on historical analogy", October 1988.
88/58	B. SINCLAIR-DESGAGNE and Mihkel M. TOMBAK	"Assessing economic inequality", November 1988.
88/59	Martin KILDUFF	"The interpersonal structure of decision making: a social comparison approach to organizational choice", November 1988.
88/60	Michael BURDA	"Is mismatch really the problem? Some estimates of the Chelwood Gate II model with US data", September 1988.
88/61	Lars-Hendrik RÖLLER	"Modelling cost structure: the Bell System revisited", November 1988.
88/62	Cynthia VAN HULLE, Theo VERMAELEN and Paul DE WOUTERS	"Regulation, taxes and the market for corporate control in Belgium", September 1988.
88/63	Fernando NASCIMENTO and Wilfried R. VANHONACKER	"Strategic pricing of differentiated consumer durables in a dynamic duopoly: a numerical analysis", October 1988.
88/64	Kasra FERDOWS	"Charting strategic roles for international factories", December 1988.
88/65	Arnoud DE MEYER and Kasra FERDOWS	"Quality up, technology down", October 1988.
88/66	Nathalie DIERKENS	"A discussion of exact measures of information assymetry: the example of Myers and Majluf model or the importance of the asset structure of the firm", December 1988.
88/67	Paul S. ADLER and Kasra FERDOWS	"The chief technology officer", December 1988.

1989

89/01	Joyce K. BYRER and Tawfik JELASSI	"The impact of language theories on DSS dialog", January 1989.
89/02	Louis A. LE BLANC and Tawfik JELASSI	"DSS software selection: a multiple criteria decision methodology", January 1989.
89/03	Beth H. JONES and Tawfik JELASSI	"Negotiation support: the effects of computer intervention and conflict level on bargaining outcome", January 1989.
89/04	Kasra FERDOWS and Arnoud DE MEYER	"Lasting improvement in manufacturing performance: In search of a new theory", January 1989.
89/05	Martin KILDUFF and Reinhard ANGELMAR	"Shared history or shared culture? The effects of time, culture, and performance on institutionalization in simulated organizations", January 1989.
89/06	Mihkel M. TOMBAK and B. SINCLAIR-DESGAGNE	"Coordinating manufacturing and business strategies: I", February 1989.
89/07	Damien J. NEVEN	"Structural adjustment in European retail banking. Some view from industrial organisation", January 1989.
89/08	Arnoud DE MEYER and Hellmut SCHÜTTE	"Trends in the development of technology and their effects on the production structure in the European Community", January 1989.
89/09	Damien NEVEN, Carmen MATUTES and Marcel CORSTJENS	"Brand proliferation and entry deterrence", February 1989.
89/10	Nathalie DIERKENS, Bruno GERARD and Pierre HILLION	"A market based approach to the valuation of the assets in place and the growth opportunities of the firm", December 1988.

89/11	Manfred KETS DE VRIES and Alain NOEL	"Understanding the leader-strategy interface: application of the strategic relationship interview method", February 1989.
89/12	Wilfried VANHONACKER	"Estimating dynamic response models when the data are subject to different temporal aggregation", January 1989.
89/13	Manfred KETS DE VRIES	"The impostor syndrome: a disquieting phenomenon in organizational life", February 1989.
89/14	Reinhard ANGELMAR	"Product innovation: a tool for competitive advantage", March 1989.
89/15	Reinhard ANGELMAR	"Evaluating a firm's product innovation performance", March 1989.
89/16	Wilfried VANHONACKER, Donald LEHMANN and Fareena SULTAN	"Combining related and sparse data in linear regression models", February 1989.
89/17	Gilles AMADO, Claude FAUCHEUX and André LAURENT	"Changement organisationnel et réalités culturelles: contrastes franco-américains", March 1989.
89/18	Srinivasan BALAK-RISHNAN and Mitchell KOZA	"Information asymmetry, market failure and joint-ventures: theory and evidence", March 1989
89/19	Wilfried VANHONACKER, Donald LEHMANN and Fareena SULTAN	"Combining related and sparse data in linear regression models", Revised March 1989
89/20	Wilfried VANHONACKER and Russell WINER	"A rational random behavior model of choice", Revised March 1989
89/21	Arnoud de MEYER and Kasra FERDOWS	"Influence of manufacturing improvement programmes on performance", April 1989
89/22	Manfred KETS DE VRIES and Sydney PERZOW	"What is the role of character in psychoanalysis? April 1989
89/23	Robert KORAJCZYK and Claude VIALLET	"Equity risk premia and the pricing of foreign exchange risk" April 1989
89/24	Martin KILDUFF and Mitchel ABOLAFIA	"The social destruction of reality: Organisational conflict as social drama" April 1989
89/25	Roger BETANCOURT and David GAUTSCHI	"Two essential characteristics of retail markets and their economic consequences" March 1989
89/26	Charles BEAN, Edmond MALINVAUD, Peter BERNHOLZ, Francesco GIAVAZZI and Charles WYPLOSZ	"Macroeconomic policies for 1992: the transition and after", April 1989
89/27	David KRACKHARDT and Martin KILDUFF	"Friendship patterns and cultural attributions: the control of organizational diversity", April 1989
89/28	Martin KILDUFF	"The interpersonal structure of decision making: a social comparison approach to organizational choice", Revised April 1989
89/29	Robert GOGEL and Jean-Claude LARRECHE	"The battlefield for 1992: product strength and geographic coverage", May 1989
89/30	Lars-Hendrik ROLLER and Mihkel M. TOMBAK	"Competition and Investment in Flexible Technologies", May 1989
89/31	Michael C. BURDA and Stefan GERLACH	"Intertemporal prices and the US trade balance in durable goods", July 1989
89/32	Peter HAUG and Tawfik JELASSI	"Application and evaluation of a multi-criteria decision support system for the dynamic selection of U.S. manufacturing locations", May 1989
89/33	Bernard SINCLAIR-DESGAGNE	"Design flexibility in monopsonistic industries", May 1989
89/34	Sumantra GHOSHAL and Nittin NOHRIA	"Requisite variety versus shared values: managing corporate-division relationships in the M-Form organisation", May 1989
89/35	Jean DERMINE and Pierre HILLION	"Deposit rate ceilings and the market value of banks: The case of France 1971-1981", May 1989
89/36	Martin KILDUFF	"A dispositional approach to social networks: the case of organizational choice", May 1989
89/37	Manfred KETS DE VRIES	"The organisational fool: balancing a leader's hubris", May 1989
89/38	Manfrd KETS DE VRIES	"The CEO blues", June 1989
89/39	Robert KORAJCZYK and Claude VIALLET	"An empirical investigation of international asset pricing", (Revised June 1989)
89/40	Balaji CHAKRAVARTHY	"Management systems for innovation and productivity", June 1989
89/41	B. SINCLAIR-DESGAGNE and Nathalie DIERKENS	"The strategic supply of precisions", June 1989
89/42	Robert ANSON and Tawfik JELASSI	"A development framework for computer-supported conflict resolution", July 1989
89/43	Michael BURDA	"A note on firing costs and severance benefits in equilibrium unemployment", June 1989
89/44	Balaji CHAKRAVARTHY and Peter LORANGE	"Strategic adaptation in multi-business firms", June 1989
89/45	Rob WEITZ and Arnoud DE MEYER	"Managing expert systems: a framework and case study", June 1989

89/46	Marcel CORSTJENS, Carmen MATUTES and Damien NEVEN	"Entry Encouragement", July 1989
89/47	Manfred KETS DE VRIES and Christine MEAD	"The global dimension in leadership and organization: issues and controversies", April 1989
89/48	Damien NEVEN and Lars-Hendrik ROLLER	"European integration and trade flows", August 1989
89/49	Jean DERMINE	"Home country control and mutual recognition", July 1989
89/50	Jean DERMINE	"The specialization of financial institutions, the EEC model", August 1989
89/51	Spyros MAKRIDAKIS	"Sliding simulation: a new approach to time series forecasting", July 1989
89/52	Arnoud DE MEYER	"Shortening development cycle times: a manufacturer's perspective", August 1989
89/53	Spyros MAKRIDAKIS	"Why combining works?", July 1989
89/54	S. BALAKRISHNAN and Mitchell KOZA	"Organisation costs and a theory of joint ventures", September 1989
89/55	H. SCHUTTE	"Euro-Japanese cooperation in information technology", September 1989
89/56	Wilfried VANHONACKER and Lydia PRICE	"On the practical usefulness of meta-analysis results", September 1989
89/57	Taekyon KIM, Lars-Hendrik ROLLER and Mihkel TOMBAK	"Market growth and the diffusion of multiproduct technologies", September 1989
89/58 (EP,TM)	Lars-Hendrik ROLLER and Mihkel TOMBAK	"Strategic aspects of flexible production technologies", October 1989
89/59 (OB)	Manfred KETS DE VRIES, Daphna ZEVADI, Alain NOEL and Mihkel TOMBAK	"Locus of control and entrepreneurship: a three-country comparative study", October 1989
89/60 (TM)	Enver YUCESAN and Lee SCHRUBEN	"Simulation graphs for design and analysis of discrete event simulation models", October 1989
89/61 (All)	Susan SCHNEIDER and Arnoud DE MEYER	"Interpreting and responding to strategic issues: The impact of national culture", October 1989
89/62 (TM)	Arnoud DE MEYER	"Technology strategy and international R & D operations", October 1989
89/63 (TM)	Enver YUCESAN and Lee SCHRUBEN	"Equivalence of simulations: A graph theoretic approach", November 1989
89/64 (TM)	Enver YUCESAN and Lee SCHRUBEN	"Complexity of simulation models: A graph theoretic approach", November 1989
89/65 (TM, AC, FIN)	Soumitra DUTTA and Piero BONISSONE	"MARS: A mergers and acquisitions reasoning system", November 1989
89/66 (TM,EP)	B. SINCLAIR-DESGAGNE	"On the regulation of procurement bids", November 1989
89/67 (FIN)	Peter BOSSAERTS and Pierre HILLION	"Market microstructure effects of government intervention in the foreign exchange market", December 1989

1990

90/01 TM/EP/AC	B. SINCLAIR-DESGAGNE	"Unavoidable Mechanisms", January 1990
90/02 EP	Michael BURDA	"Monopolistic Competition, Costs of Adjustment, and the Behaviour of European Manufacturing Employment", January 1990
90/03 TM	Arnoud DE MEYER	"Management of Communication in International Research and Development", January 1990
90/04 FIN/EP	Gabriel HAVAVINI and Eric RAJENDRA	"The Transformation of the European Financial Services Industry: From Fragmentation to Integration", January 1990
90/05 FIN/EP	Gabriel HAVAVINI and Bertrand JACQUILLAT	"European Equity Markets: Toward 1992 and Beyond", January 1990
90/06 FIN/EP	Gabriel HAVAVINI and Eric RAJENDRA	"Integration of European Equity Markets: Implications of Structural Change for Key Market Participants to and Beyond 1992", January 1990
90/07 FIN/EP	Gabriel HAVAVINI	"Stock Market Anomalies and the Pricing of Equity on the Tokyo Stock Exchange", January 1990
90/08 TM/EP	Tawfik JELASSI and B. SINCLAIR-DESGAGNE	"Modelling with MCDSS: What about Ethics?", January 1990
90/09 EP/FIN	Alberto GIOVANNINI and Jae WON PARK	"Capital Controls and International Trade Finance", January 1990
90/10 TM	Joyce BRYER and Tawfik JELASSI	"The Impact of Language Theories on DSS Dialog", January 1990
90/11 TM	Enver YUCESAN	"An Overview of Frequency Domain Methodology for Simulation Sensitivity Analysis", January 1990
90/12 EP	Michael BURDA	"Structural Change, Unemployment Benefits and High Unemployment: A U.S.-European Comparison", January 1990
90/13 TM	Soumitra DUTTA and Shashi SHEKHAR	"Approximate Reasoning about Temporal Constraints in Real Time Planning and Search", January 1990
90/14 TM	Albert ANGEHRN and Hans-Jakob LÜTHI	"Visual Interactive Modelling and Intelligent DSS: Putting Theory Into Practice", January 1990
90/15 TM	Arnoud DE MEYER, Dirk DESCHOOLMEESTER, Rudy MOENAERT and Jan BARBE	"The Internal Technological Reneval of a Business Unit with a Mature Technology", January 1990
90/16 FIN	Richard LEVICH and Ingo WALTER	"Tax-Driven Regulatory Drag: European Financial Centers in the 1990's", January 1990
90/17 FIN	Nathalie DIERKENS	"Information Asymmetry and Equity Issues", Revised January 1990
90/18 MKT	Wilfried VANHONACKER	"Managerial Decision Rules and the Estimation of Dynamic Sales Response Models", Revised January 1990
90/19 TM	Beth JONES and Tawfik JELASSI	"The Effect of Computer Intervention and Task Structure on Bargaining Outcome", February 1990
90/20 TM	Tawfik JELASSI, Gregory KERSTEN and Stanley ZIONTS	"An Introduction to Group Decision and Negotiation Support", February 1990
90/21 FIN	Roy SMITH and Ingo WALTER	"Reconfiguration of the Global Securities Industry in the 1990's", February 1990
90/22 FIN	Ingo WALTER	"European Financial Integration and Its Implications for the United States", February 1990
90/23 EP/SM	Damien NEVEN	"EEC Integration towards 1992: Some Distributional Aspects", Revised December 1989
90/24 FIN/EP	Lars Tyge NIELSEN	"Positive Prices in CAPM", January 1990
90/25 FIN/EP	Lars Tyge NIELSEN	"Existence of Equilibrium in CAPM", January 1990
90/26 OB/BP	Charles KADUSHIN and Michael BRIHM	"Why networking Fails: Double Binds and the Limitations of Shadow Networks", February 1990
90/27 TM	Abbas FOROUGHI and Tawfik JELASSI	"NSS Solutions to Major Negotiation Stumbling Blocks", February 1990
90/28 TM	Arnoud DE MEYER	"The Manufacturing Contribution to Innovation", February 1990
90/29 FIN/AC	Nathalie DIERKENS	"A Discussion of Correct Measures of Information Asymmetry", January 1990
90/30 FIN/EP	Lars Tyge NIELSEN	"The Expected Utility of Portfolios of Assets", March 1990
90/31 MKT/EP	David GAUTSCHI and Roger BETANCOURT	"What Determines U.S. Retail Margins?", February 1990
90/32 SM	Srinivasan BALAKRISHNAN and Mitchell KOZA	"Information Asymmetry, Adverse Selection and Joint-Ventures: Theory and Evidence", Revised, January 1990
90/33 OB	Caren SIEHL, David BOWEN and Christine PEARSON	"The Role of Rites of Integration in Service Delivery", March 1990

90/34 FIN/EP	Jean DERMINE	"The Gains from European Banking Integration, a Call for a Pro-Active Competition Policy", April 1990
90/35 EP	Jae Von PARK	"Changing Uncertainty and the Time-Varying Risk Premia in the Term Structure of Nominal Interest Rates", December 1988, Revised March 1990