

**"MANUFACTURING DELIVERS!
BUT WILL THAT BE ENOUGH?"**

**(Report on the 1994 European
Manufacturing Futures Survey)
by**

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MANUFACTURING DELIVERS !

But will that be enough ?

Report on the 1994 European Manufacturing Futures Survey

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Abstract

Since 1983 we have at INSEAD carried out the European Manufacturing Futures Survey. The report of the 1994 survey indicates that European manufacturers have made significant improvements compared with previous surveys in the performance of the production system. Also the reorganisation of the production network, in line with the opportunities offered by the creation of a large European market, has paid off nicely. For the near future European Manufacturers will focus on the improvement of the total delivery system.

Is this enough ? From the survey we learn that European Manufacturers may perform well, but have perhaps an approach which is too focused on manufacturing. They may well neglect the bundle of services in which the product has to be embedded. We have also noticed a disillusion and neglect of process technologies.

Key words: manufacturing strategy, international manufacturing, delivery systems

1. Introduction

The world of manufacturing has gone through a dramatic change over the last couple of years. When we started the European Manufacturing Futures Survey in 1983 ¹ the common wisdom about manufacturing was that we were ready for a rediscovery of manufacturing as a strategic tool for increasing the firm's competitiveness, and that we in the West had to catch up with Japanese manufacturing techniques such as Strategic Quality management or Just in Time delivery procedures. Ten years later we are confronted with a totally new situation. Few among us still need to be convinced about the importance of having a well organised manufacturing function. And in many of the best European companies manufacturing productivity has either caught up with the Asian competitors, or the gap has become too small to create a real competitive threat. "Our manufacturing has become good enough," is a comment we have heard regularly over the last months.

The current challenge for senior manufacturing managers has more to do with what the manufacturing function offers beyond pure transformation of goods. In order to compete we need to work on how manufacturing can be seen as one of the elements in the bundle of services and goods that we offer as value to the customer.

In 1992 we argued that manufacturing has to break through its traditional barriers and see itself as a bundle of processes.² The four important processes that we observed were the traditional transformation activity, the supply and delivery chain, the new product introduction process and the learning process. We called this the 'Virtual Factory' to indicate that manufacturing had to collaborate with partners inside and outside the organisation in order to deliver the value to the customer. From the 1994 European Manufacturing Futures Survey ³ it appears that manufacturers in Europe have indeed pursued the effort to develop a more integrated view of their role in the value creation process, and have chosen to invest heavily in the whole delivery process in order to create a 'manufacturing with a plus'. That does not mean that they neglected the other processes. But until now the efforts to improve the product development process for example have not yet been very successful.

This emphasis on the improvement of the dependability and speed of the delivery have to be seen in the context of the internationalisation of the production function. European manufacturers expect a significant increase in the internationalisation of the supplies, the production and the sales of their business units. This requires a drastic reorganisation of the network of plants. Such a reorganisation will have a strong influence on the supply and delivery chain.

¹The European Manufacturing Futures Survey, carried out at INSEAD, Fontainebleau, is part of a larger research project, The Global Manufacturing Futures Survey, which was initiated in 1981 by J.G. Miller at Boston University, and which was extended to Europe and Japan in 1982. Since 1986 research teams from Singapore, Korea, Australia, New Zealand, Taiwan, Mexico, and South Africa have gradually joined the project.

²De Meyer A., 1992, The Virtual Factory, INSEAD Working Paper

³See Appendix 1 for a description of the sample

2. Efforts pay off

The average performance improvements obtained by the respondents to our survey realised over the last two years in manufacturing are impressive (In table 1 we give a rating of the 10 most and the six least improved performance indicators over the period 1981-1993). With the exception of the profitability measure they are on the average at the same level as the improvements obtained in the US and considerably higher than the ones obtained in Japan over the same period⁴. Significant measures such as the average defect rate at the end of the manufacturing process, the manufacturing cycle time, the turnover of the work in process or the delivery lead time have all progressed considerably. The action programmes related to strictly manufacturing orientated programmes as well as the ones related to the delivery process seem to have paid off nicely. Even the profitability, at an average net pre-tax profit ratio of 7.3 % for the last fiscal year, has improved significantly, and this in spite of the difficult economic circumstances.⁵

Table 1

PERFORMANCE IMPROVEMENTS 1991-1993 EUROPE	
Indicator	Average improvement in % (100 = base in 1991)
1. Defect rate at the end of the production line	122
2. Manufacturing cycle time	120
3. Work in process turnover	119
4. Delivery lead time	117
5. Variety of producible products	117
6. Procured materials turnover	116
7. On time delivery	116
8. Speed of new product development	115
9. Procurement lead time	115
10. Profitability	115
...	
18. Speed of introducing product changes in the production	111
19. Set up time	109
20. Defect rate of procured products	109
21. Sharing goals with suppliers	108
22. Market share	104
23. Number of avoidable engineering change orders	103

⁴Source : the North American and Japanese Manufacturing Futures Survey, published resp. by our colleagues J. Kim (Boston University) and H. Katayama (Waseda University, Tokyo)

⁵This somewhat unexpected result is confirmed by recent economic statistics which show that quite a few companies were able to use the recession to streamline their organisations and to keep their profitability stable or even increase it.

The six lowest improvements can be grouped into three categories: the market share stagnates, the partnership with suppliers still encounters difficulties and there are a lot of difficulties with product design changes. Engineering change orders are difficult to reduce, the speed of introducing product design change does not improve and engineering cannot obtain the necessary equipment changeover times in order to be flexible. It still takes on average 22.4 months in Europe between the start of a new product concept, to the full scale production of saleable products, as opposed to 20.8 months in the US. and 15.0 months in Japan. And finally, whereas the downstream partnership with the customers may start working, it appears that the upstream partnerships with suppliers and the design and engineering function encounters a lot of difficulties.

3. Improvements were obtained through people and network management

These improvements were obtained mainly through investments in people and in the organisational network. On the contrary, technology has not been particularly helpful. Out of a choice of 37 possible action programmes the top ten list of most 'popular' action programmes implemented over the last two years (table 2) contains on the one hand a number of people related programmes, such as empowerment of workers, training, crossfunctional teams, continuous improvement techniques, and on the other hand a set of network orientated measures such as the reorganisation of the plant network and the implementation of integrated information systems. Looking at the pay-off of these programmes, we get the impression that the efforts along these two broad categories have been effective. The reorganisation of the plant network combined with the high pay off of Just in Time systems suggests that the effort in the reorganisation of the delivery network has been a priority, and one that pays off for that matter.

Table 2

POPULARITY & PAY OFF OF ACTION PROGRAMMES EUROPE 1992-1994 (37 actions programmes were proposed)	
popularity (most to least)	pay off (highest to lowest)
worker empowerment	reorganisation of plants networks
continuous improvement	continuous improvement
management training	reorganisation of plant lay out
worker training	worker training
improving the quality of life	management training
develop manufacturing strategy	supervisor training
Integrate information systems across functions	computer aided design
integrate information systems in manufacturing	worker empowerment
develop new performance measures	cross functional teams
reorganisation of plant networks	just in time
...	...
flexible manufacturing systems	design for manufacture
activity based costing	reconditioning of physical plants
closing and/or relocation of plants	integrate information systems across functions
reverse logistics	recycling
introducing robots	introducing robots

When we look at the action programmes at the bottom of these two tables we see that investments in the environmental programmes have neither been popular nor effective in the short term. Straightforward automation with robots is at the absolute bottom of the ranking of popularity and pay-off, and also other technological action programmes such as flexible manufacturing systems, computer aided manufacturing or the reconditioning of the physical plant have dropped considerably in popularity and pay-off as compared to previous surveys. Technology has not been the key to performance improvement! This raises a series of questions about our attitude towards technology as a production factor. Have we over invested in technology? Are we disappointed with its results? Do we have problems with the implementation of technology? Or is technology simply a non issue?

4. Building on strengths in quality and delivery

The investments in quality and the delivery chain have led to more than a simple short term performance improvement. They appear to have become real core competencies. In table 3 one finds the comparison of the competitive priorities both in terms of current strength vis-à-vis the best competitor as well as in terms of future importance. The four top strengths in the left column of the table cover four different aspects of conformance and design quality. After this are two strengths related to the delivery process. At the bottom of this ranking of strengths in manufacturing, we find a mix of service (both after sales service and in terms of distribution penetration), efficiency and the capability to launch new products. The strength in quality does not differentiate between European, American US., or Japanese manufacturers any more. But if the strength in speed of delivery proves to be correct, it sets us apart from these global competitors. On the other hand we do score considerably lower than the North American manufacturers in particular in the delivery of services around the product, or in what one could call the 'augmented' product or the product which is offered with a wide array of services around it.

Table 3

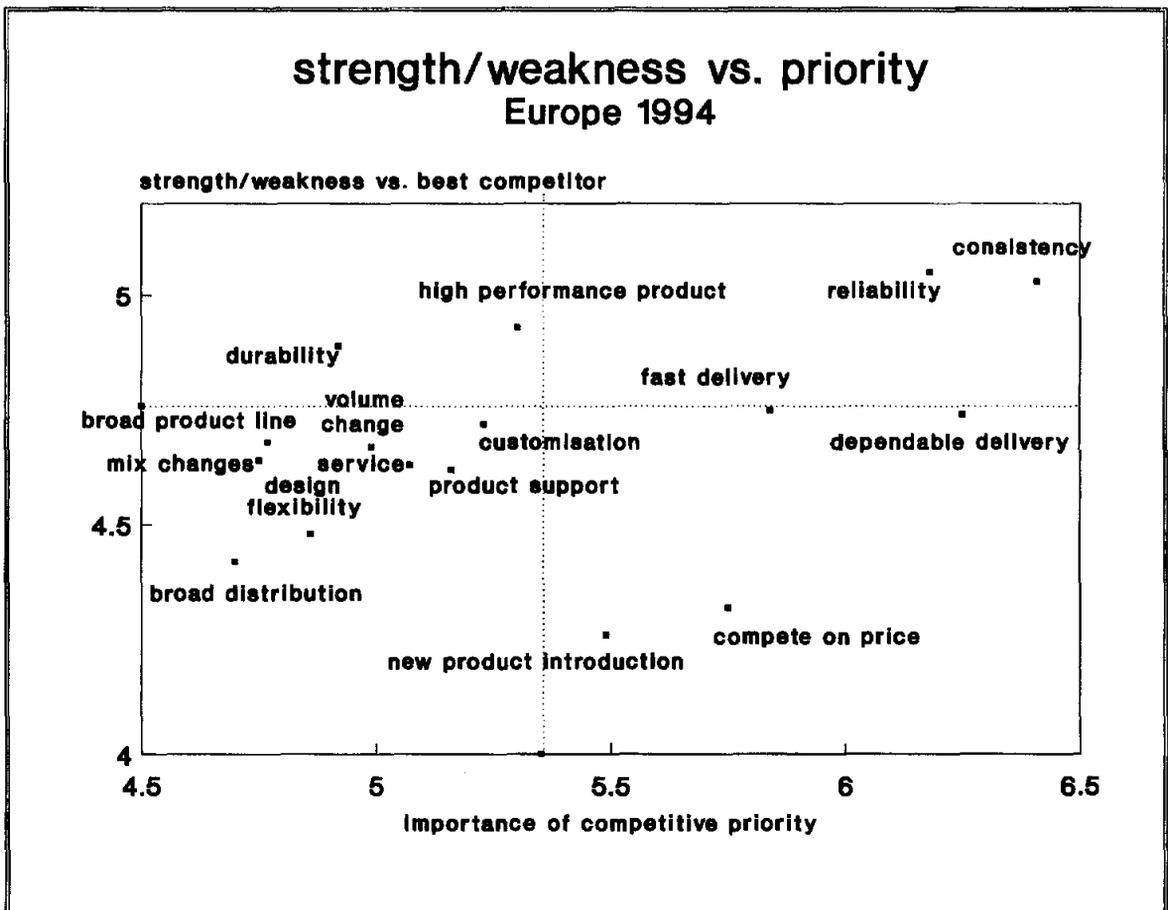
COMPETITIVE PRIORITIES AND STRENGTHS in decreasing order of importance	
priority (ability to provide)	strength vs. best competitor (ability to provide)
consistent quality	reliable products
dependable deliveries	consistent quality
reliable products	high performance products
fast deliveries	durable products
competition based on price	fast deliveries
quick introduction of new products	dependable deliveries
high performance products	customisation
customisation	after a broad product line
effective product support	rapid volume changes
effective after sales service	rapid mix changes
rapid volume changes	effective after sales service
durable products	effective product support
design flexibility	design flexibility
broad product line	broad distribution
rapid mix changes	competition based on price
broad distribution	quick introduction of new products

European Manufacturing Futures Survey 1994

The impression that quality and delivery is becoming a core competence for the European manufacturer is strengthened by the analysis of figure 1. Here we have mapped the strengths for the different competitive priorities versus how important these priorities will be in the market place over the next five years. The dotted line indicates an average for all respondents and all priorities. In the top right hand corner we find the priorities which are considered to be strategically important and where the respondents feel comfortable that they are stronger than their best competitors. This is as close as we can get to defining their core competencies in manufacturing. Clearly it is the combination of quality with delivery that stands out.

In the bottom right hand corner we find the priorities which are currently a weakness, but which will become very important in the market place. These future competencies are similar in previous surveys; the combination of cost efficiency and the ability to introduce new products quickly. The remaining weakness of these priorities is in line with how some of the performance indicators have not really improved. The fact that since 1988 these priorities remain important, but that we do not seem to make any substantial improvement compared to our best competitors, is not a good sign of our ability to improve Europe's competitiveness.

Figure 1



Europe's manufacturers remain very manufacturing orientated. We get the impression that they are convinced that if they keep the internal processes under control and if they create a smooth delivery process that they will be very competitive. In the back of their minds they admit that the new product introduction process is important. But in spite of repeated exhortation about it, they do not seem to make any real relative improvement on their ability to introduce new products more quickly.

Even more disturbing to us is that by focusing on the manufacturing function itself, they seem to neglect the integration of the products with the services that is needed to create the value that is required by the customer. We are convinced that, more than ever, the product is only a sort of pretext to deliver a service. Yet the survey answers that we obtained from our respondents seem to suggest that they think that the customer will be happy if one produces the product and delivers it accurately and on time. Perhaps that is true, but we suspect that in many cases the service after sales, the product amenities and the support in how to use the product, the ability to offer a very broad distribution and the flexibility to effectively adapt oneself quickly to changing customer demands, become the real decisive factors in customer choice. This is all the more important since European manufacturers admit that they cannot compete on price. Yet all these characteristics are fairly low on the priority list of the European manufacturers, and we do not shine by any outstanding performance in these areas.

5. A continued investment in people and integration

The list of priorities for future action is remarkably similar to the one of past action plans (table 4). There is no reason to be surprised about it. What European manufacturers did in the past has paid off and they probably see no reason 'why they should change a winning horse'! Efforts to continuously improve the manufacturing processes remain at the top of the priority list. Decentralisation of the decision making or worker empowerment, and stimulating workers to work across the functions or to participate in inter-functional teams will be actively invested in. To support the workers and the management a considerable effort will be made in training and in information systems. Good information, appropriate performance measures and intensive training should help the European manufacturer to reduce an overly functional approach and should enable us to obtain, through continuous improvement similar improvement rates as in the recent past.

Table 4

**FUTURE EMPHASIS ON ACTION PROGRAMMES
IN DECREASING ORDER OF EMPHASIS**

Continuous improvement

Worker empowerment

Cross-functional teams

Develop a manufacturing strategy

Worker training

**integrate Information Systems across different
functions**

Supervisor training

Develop new performance measures

integrate Information Systems in manufacturing

interfunctional teamwork

Reengineering business processes

Develop supplier partnerships

Benchmarking

...

Reorganisation of plant networks

SQC/SPC

Flexible Manufacturing systems

Computer aided manufacturing

Reconditioning physical plants

Closing and/or relocating plants

Recycling

Robots

Europe 1994

It all sounds a bit conservative in that the future appears to be the continuation of the past. Yet there are also some new ideas in the list: reengineering of the business processes and the further development of the supplier network. These action plans are new but not really a break with the past. The recent ideas about business process reengineering are quite familiar to many manufacturing managers who have spent quite some time on similar techniques coming from industrial engineering. The investment in the relationship with the suppliers is also very much in line with past efforts to improve the delivery process. The continued investment in the integration of information systems may actually fit in the same context. It remains intriguing that now after six years and three consecutive surveys, the action to integrate information systems across the different business functions has been heavily emphasised in the past, has had a miserable pay-off, but will be heavily emphasised in the future. The perseverance with which European manufacturers keep on investing in these cross-functional information systems has been explained in several ways; perhaps the lead time for the return is longer than the two year pace at which the survey is carried out. Or perhaps we have not really been able to link the investment in information systems to the strategy of the organisation. However, if we borrow from recent publications on business process reengineering or the management of supplier networks we may hope that in a next survey the investment in information systems will have a better pay-off.

Other investments in technology remain unpopular in the future intentions. The unpopularity of the introduction of stand alone robots can be explained easily by the considerable number of disaster stories of exaggerated automation. But the fall in popularity of for instance flexible manufacturing systems is more surprising. In earlier surveys ⁶ the effort to obtain cost efficient flexibility through sophisticated flexible manufacturing systems scored indeed very high. If flexibility is pursued in the near future, it appears that it is not expected that technology will bring it.

There is a risk in this negligence of the technological potential. Perhaps we should not expect too much from specific technologies, but process technology is and will remain a key element of a company's competitive position. Yet in the top fifteen action plans in Europe nothing refers to process technology development (this is in stark contrast to the results of the Japanese survey ⁷ in which the development of new process remains very high, even if flexible manufacturing systems have also dropped considerably in importance). A while ago European manufacturers seemed to expect success from automation and investment in technology. The lessons we learned from a number of outstanding manufacturers helped us to understand that a lot of improvement could be made by looking at the management systems and by a better deployment of human resources but we may be going too far and neglect the basic improvement of our process technologies.

⁶See De Meyer A, Nakane J., Miller J.G. and Ferdows K., 1989, Flexibility : the Next Competitive Battle in Manufacturing, Strategic Management Journal, vol. 10, pp. 135-144 for the 1986 survey where flexible manufacturing systems scored very high in particular in the Japanese survey.

⁷op. cit.

6. The international context

The actions and priorities that we have described in previous sections have to be seen in the context of an increased internationalisation of the manufacturing activities. In table 5 we have summarised the expected evolution of international sales production and purchasing. The interpretation of this table has to be done very carefully. Indeed as we explain in the appendix the respondents can answer for the whole company or for a particular business unit or plant. This perhaps explains why the proportion of domestic manufacturing is quite high. Yet the trend is clear: less manufacturing at home or even in Europe, more in the rest of the world; more purchases from outside Europe, less from the domestic or even European market; and more sales in Europe and the rest of the world. Manufacturing goes offshore !

Table 5 : Evolution of international sales, production and purchasing (in % of the total)

	sales 1993	expected sales 1996	manufacturing 1993	expected manufacturing 1996	purchases 1993	expected purchases 1996
Domestic	42.0	36.4	70.5	68.9	53.3	46.5
Europe	38.1	40.7	21.7	19.2	35.3	34.7
Rest of World	19.9	22.9	9.9	13.7	14.0	18.8

Why this trend? The reasons are summarised in order of priority in table 6: Common wisdom may have hypothesised that labour cost would have been the most important reason. Yet this is not true. In fact it is the third most important reason, but the closeness to customers and the delivery service that one can provide seem to take primary importance in the establishment of foreign production facilities. Labour both as a cost factor, but also for its quality comes in a second place. Access to suppliers of goods or technology and competitors seem to be less important in the decision to go abroad.

The important role of customers is to some extent confirmed by the policy about customisation. On a scale from 1 (complete adjustment to local taste) and 7 (no adaptation to local markets) the 87 respondents who indicate that they answer for an existing international network score on average about 4.8, close to a limited modification to local markets. Limited adaptation but not fully: combined with the second reason for establishing foreign operations this seems to indicate that the internationalisation process is in line with the other intention and action plans of the European manufacturers. Also on an international scale they want to improve the delivery process.

Table 6 :
Current Reasons for internationalising the operations

Being closer to customers
Providing a faster service
Access to low cost labour
A favourable political environment
Access to qualified labour
Availability of tax breaks
Access to high quality suppliers
Access to low cost suppliers
Access to a cheap source of raw materials
Quality of life
Presence of major competitors
Access to technological know-how

In the integrated management of the networks of plants we still have a long way to go. The respondents indicate that although some regional plants are dependent on the outputs from other plants, in many cases all regional plants are completely independent in their management structure and report to a central manufacturing staff. Plant network reorganization has been a successful action plan, but has still a way to go!

6. Manufacturing delivers.... but is that enough to compete ?

What conclusions can we draw from these results? We have used the title 'Manufacturing delivers', because we see that indeed European manufacturers attempt to and succeed in living up to their promises. First of all they live up to the expectations to improve the quality of the manufacturing processes. The performance indicators and the core competencies that have been built up seem to confirm this. The way they have achieved this is by applying the manufacturing methods which are generally attributed to excellent Japanese manufacturing organisations, and which are sometimes described by the term 'lean manufacturing'.

They deliver also in a more down to earth way: it appears that the delivery process and probably the whole of the logistics process is in the focus of their attention. Faster and more dependable delivery, both domestically and internationally is how Europeans want to compete. Although quite some progress has been made in this area, there remain a number of problems to be solved, in particular in the relationship with suppliers. Supplier partnership have been advocated for almost a decade, but European Manufacturers have made only a little improvement in the defect rate of procured products, and more importantly in the sharing of goals with the supplier network.

But is that enough? Is the improvement in manufacturing and in the delivery system sufficient? Will this make the European manufacturing industry really competitive on a world-wide scale? I have some serious doubts. First European manufacturers have exhorted for almost a decade that the fast and efficient introduction of new products will be important in the future market place. Yet it seems one of the areas where we make the least progress. We simply do not seem to get the process of engineering changes, customisation of the products, or flexibility of the production process under control. Secondly I am convinced that we have a view of manufacturing which is too product-orientated. A manufactured product has become, in many cases, a mere component in a total bundle of products and services that try as a whole to satisfy the customer. Cars are not important but a reliable and cheap kilometre of transport is what the customer needs. Electrical motors are not what the customers buys, but the availability of power is what he is interested in. We pick up almost no indications that European manufacturers see the importance of the 'augmented' product. Perhaps that is the real challenge for the next five years in the manufacturing environment. How do we link the product and the production process to services and product amenities beyond the mere delivery process?

Finally I want to raise a question on the lack of enthusiasm about technology. Implementing manufacturing programmes requires, in my opinion, a balance between people-orientated programmes, systems implementation and technology deployment. In the mid-eighties we probably went overboard with the emphasis on new process technology. Today, all effort seems to go into people. Are we not again losing the equilibrium? Is Europe scared of technology? Or do we not expect any competitive advantage from it?

APPENDIX

This year we received 164 responses to the survey. The answers came from 18 different countries and represent a wide variety of different industries (on a three digit SIC level).

38.4 % of the respondents answer for a company, 36.6% for a division and 20.7 % for a plant. The rest is non specified or other.

The respondents are typically large organisations with an average of 2756 employees of which 1341 direct manufacturing employees.

Consumer goods producers represent 30.5 % of the sample. 23.2 % of the sample describes its production process as a process production flow, while 76.8% describes it as a discrete production flow.

The survey is biased towards the more successful manufacturing organisations: the respondents had on average a growth rate in unit sales of 11.9%, and made a net pre-tax profit of 7.3%.

Some salient characteristics of the respondents are :

sales of primary product as % of total sales	76.1 %
market share of primary product	30.4 %
capacity utilisation	69.8 %
average age of equipment	10.6 years
average lead time for conversion	41.3 days
inventory turnover	9.54
% of on time deliveries	89.5 %
manufacturing cost as % of sales	50.9 %
materials as a % of manufacturing cost	53.2 %
direct labour as a % of manufacturing cost	20.0 %
cost of physical distribution as % of sales	8.6 %
warranty cost as a % of sales	1.5 %
lead time for new product development	22.4 months