

Increasing Dynamic Adaptability through the Application of Benchmarking in Operational Navigation

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1. CHALLENGES TO MANUFACTURING PLANTS

The world economy is in a state of radical change. Changes due to increasing globalization of acquisition and selling markets are having sweeping effects on the companies. Through increasing international competition the pressure on manufacturing plants is growing. The case of the German machine-tool industry shows that presence on international dynamically growing markets is necessary for survival if the national market is severely declining and if you do not wish to leave the field to international competitors.

Companies which are set up according to conventional principles of Taylorism, with sharply defined work content and correspondingly obsolete information flow policies, are no longer in a position to come up with the necessary inner dynamism and evolutionary speed. As a reaction to fundamental changes in the environment, however, strong self-dynamism and the ability for further development (evolution) are being required from the companies. Responsive company structures which assure dynamic adaptability must be developed.

Progress in information and communication technology has allowed almost any amount of information about markets and competitors to become available. This information is meant to be used and to be compared with a company's own performance parameters in order to achieve an increased dynamic adaptability by means of benchmarking.

2. DYNAMIC ADAPTABILITY

Growth processes of companies are essentially sustained by innovations in products, processes and structures. They are among the central success elements in the marketplace and in competition. "It are not always large things, however, which disturb the work process, but hundreds of little ones."¹ Innovations in successful companies, which as a rule occur intermittently and by leaps and bounds, are complemented by a variety of smaller improvements (continuous improvement process) introduced deliberately. In order to achieve longterm success, companies must possess the ability for dynamic adaptation, both by leaps and bounds through innovations as through continuous improvement processes (see figure 1).

A fundamental change how to view things is required from the companies. Considerations must turn from static to dynamic systems, from mechanistic to organic representation models. A manufacturing company must learn to understand its processes and structures as a system in its entirety. It does not develop in a linear and accurately predictable way, and its boundaries - seen from within and from without - are fuzzy and permeable. This in mind, the model of the "fractal factory" is being presented.

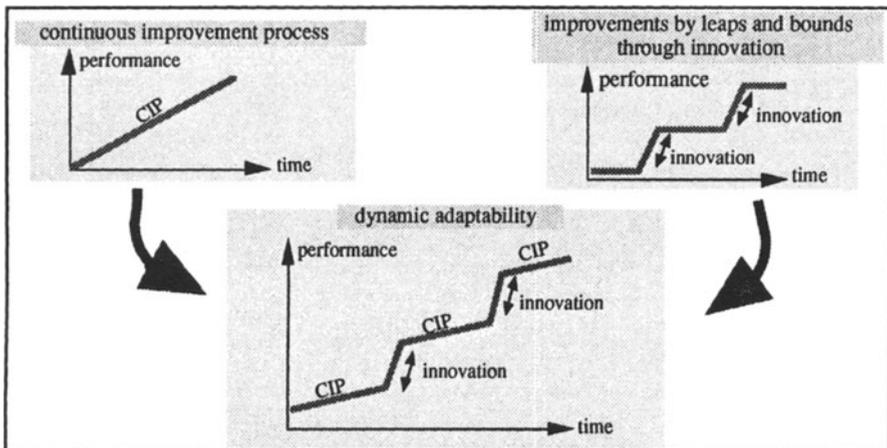


Figure 1: Dynamic adaptability consists of improvements by leaps and bounds through innovation and continuous improvement processes.

3. FRACTAL FACTORY AND OPERATIONAL NAVIGATION

The fractal factory gives a wholistic approach for solutions in order to initiate, strengthen and guide the self-dynamism of partially autonomous structures which are called fractals. A fractal is an independently acting unit within the company, with goals and performance to be clearly described. The description of fractal structures can be broken down into six horizontal levels: on cultural, strategic, socio-psychological, economic-financial, information and process level².

	vitality features:
cultural level:	<ul style="list-style-type: none"> • company culture • value system, guiding principles • "mission" of the company
strategic level:	<ul style="list-style-type: none"> • company strategy • value system • company structure • products
socio-psychological level:	<ul style="list-style-type: none"> • staff relation structure • awareness, ability and behaviour of the staff • structure organization in teams and work groups • information and communication among staff
economic-financial level:	<ul style="list-style-type: none"> • economy • profitability • resource consumption • value creation
information level:	<ul style="list-style-type: none"> • information flow • information systems
process level:	<ul style="list-style-type: none"> • processes • procedures/ methods/ instruments • technical systems

Figure 2: Vital companies distinguish themselves through dynamic adaptability on 6 horizontally arranged levels.

Fractals can be further characterized with the following features:

- Fractals are self-similar with regard to the six levels.
- Fractals practise self-organization.
- The goal system emerging from the goals of the fractals is non-contradictory and must serve the attainment of company goals.
- Fractals are connected to an efficient information and communication system. They themselves determine type and extent of their access to data.
- The performance of the fractals are constantly measured and evaluated.

Thus fractals become the central formative elements in a company. Crucial factor is the increased transfer of management and control functions to the employees. This applies to employees on the strategic as well as on the operational level equally.

In order to guide the "movements" of the fractals in the respective appropriate direction of the entire process, a function is required which was given the nautical metaphor of navigation. Fractals navigate in a constant review of their position in the target zone and make reports and possible corrections. Applied to an industrial company, these functions have up to now been connected with the term "controlling".³ Operational navigation could be characterized as decentralized control for partially autonomous work groups. Differences in concept and content, however, make a differentiation from the current term of 'controlling' necessary. Operational navigation aims at improving initiation, control and coordination of the continuous improvement process as entirety to improve the outcome, particularly with regard to the lack of orientation in the market (see figure 2). The employees within partially autonomous units of an organization are those agents of the continuous improvement process.

The improvement process runs continuously and responsively when high intra-departmental dynamism exists. Small and quick feedback loops are prerequisites for a high intra-departmental dynamism within the company. They allow prompt indication of a changed actual situation and the recognition of deviations between the desired goal and the actual position at the moment.

Derived from these objectives are the following essential features of the operational navigation:

- Employee orientation and participation: all employees work together in the team.
- Goal orientation: all team members work towards common goals.
- Reporting results: The achieved work results are made known to everyone in the team.
- Decentralism: Within the given goals, the team determine their respective use of resources independently.
- Process orientation through customer-supplier relations: The team regards the following work groups as internal customers.

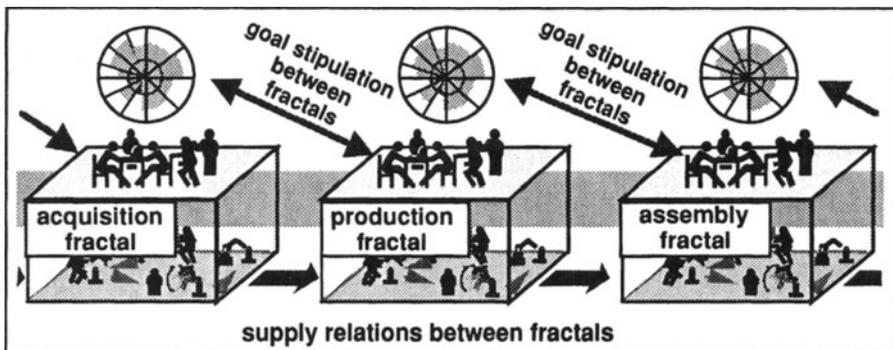


Figure 3: Operational Navigation: process orientation through customer/ supplier relations

In detail this means the company goals must become transparent and be defined on all company levels. A constant feedback regarding the degree of goal attainment, especially in the value creation process, must guarantee - as up-to-date and process related as possible - a direct investigation of the causes of possible deviations.

Coordination and control of decentralized, partially autonomous units of an organization take place in a 5-stage-navigation process:

- 1) define and provide goals
- 2) report actual data
- 3) analyze deviations and make evaluations
- 4) formulate plans of action and alternative procedures
- 5) carry out measures

Special significance should be attached to the setting and definition of goals in operational navigation. It can only provide satisfactory results if proper goals are set. In many companies however, customer requirements and competition factors are not systematically analyzed. Goals are predominantly set by the company itself, according to the subjective estimation of its management.

However, in order to arrive at correct goals it is necessary for an enterprise to direct its view outwards. To analyze the performance parameters within one's own company systematically and to compare them with others known as 'best in class' became famous in the USA under the term of "benchmarking".⁴

4. OPERATIONAL NAVIGATION AND BENCHMARKING

Benchmarking is a process of continuously comparing and measuring an organization with other leaders anywhere in the world to gain information which help to take action for the improvement of its performance.

Operational navigation controls and coordinates processes. In order to establish a relation to benchmarking, emphasis should here be placed on process benchmarking. This is to benchmark discrete processes against organizations with performance leadership in those processes. It involves seeking the best procedure to conduct a particular business process.⁵ Process benchmarking is a form of analysis distinct from other types of benchmarking, e.g. strategic, performance and competitive.

Here a representative variety of known benchmarking processes⁶ is presented in seven steps:

- 1) Establishment of the object of benchmarking.
- 2) Judging own performance.
- 3) Selection of benchmarking partners.
- 4) Analysis and comparison of data.
- 5) Derivation of goals and measures.
- 6) Implementation.
- 7) Control and repetition of benchmarking.

Benchmarking and operational navigation are two parallel processes which correlate closely through a constant exchange of information, where the benchmarking process is meant to run on the strategic and the navigation process on the operational level.

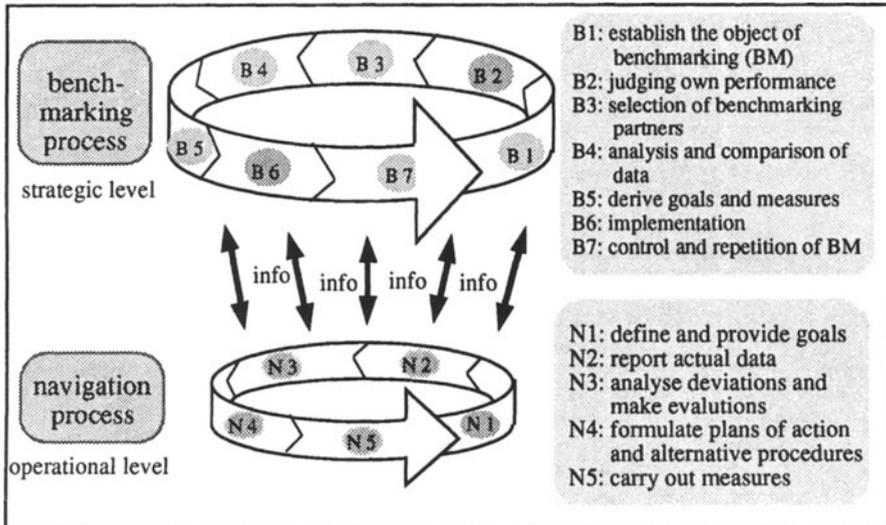


Figure 4: Constant exchange of information allows benchmarking and navigation processes to closely correlate.

Both processes are to operate continuously and information is to be exchanged after each step in order to achieve a permanent feedback effect. A loop cycle should not be expected from the benchmarking process in order to transmit extensive data to navigation. Instead continuous transmission of benchmarking information should take place. Then even fragmentary and superficial pieces of information can be useful for the navigation process. Reasons for a continuous exchange of information are:

- Employees are responsible for the transformation of the goal standards in operational navigation. Each piece of information passed on from the benchmarking process (e.g. by the selection of competitors) leads to its being tied into the entire process. Along with it comes a considerable motivational effect. In addition, the shock effect for the employees, caused by a confrontation with the often hard realities of external comparison, fails to appear.
- Significant indications for benchmarking, for example regarding critical processes, could be drawn from the navigation process. This can be dynamically adapted to the situation through constant feedback from the benchmarking process.

The linking with the navigation process is presented using the example of the benchmarking steps 2 (judging own performance) and 6 (implementation).

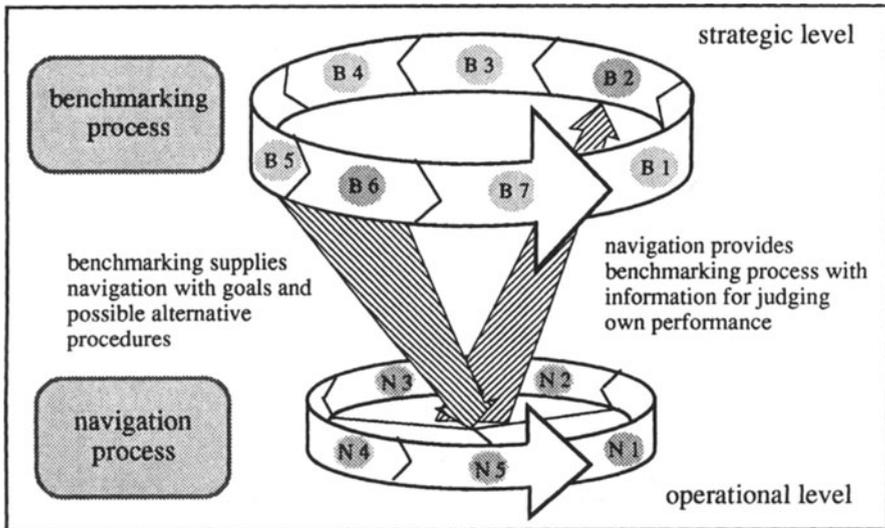


Figure 5: Examples of relations between benchmarking and navigation

Connecting Point 1: Judging Own Performance

In order to carry out an internal or external comparison, the own performance must first be measured and analyzed. Many companies still lack the provision of such data and indicators about their own efficiency. Operational navigation comes into effect here. Navigation provides a variety of information about operational processes. On the one hand, this information can give impulses to a comparison using benchmarking. On the other, these data provide the starting base for a benchmarking process which is to be carried out.

Connecting Point 2: Implementation

In running through the benchmarking stages, goals and plans are formulated in step 5 and must be put into action in step 6. So far the implementation of goals and plans did not receive the necessary attention in discussions. It is the application of measures which seems to cause the greatest difficulties for industrial companies. Benchmarking provides strategic goals which lead to a continuous improvement of partial processes in the value creation chain.

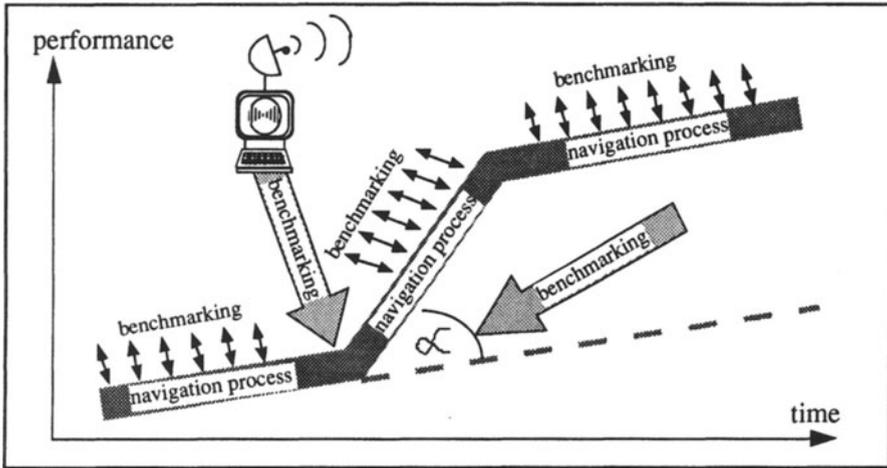


Figure 6: Benchmarking: the strategic radar in the company.

Both processes therefore have a fruitful relationship with each other. With navigation, employees in the value creation process get a method which allows them to carry out an intended, continuous improvement. Benchmarking has three functions here:

- Benchmarking is a continuous motivating force for the employees through its constant provision of information.
- Benchmarking sets free creative potentials through external comparison and thereby provides important impulses for innovative leaps.
- Benchmarking describes the extent and speed of necessary performance increase.

To sum up, benchmarking can be considered as a strategic radar, as it sets the goal direction for dynamic adaptability. Operational navigation eventually leads the company to improved efficiency through the operational transformation of strategic goals (see figure 6).

5. CASE STUDY

The connection of benchmarking with operational navigation was realized as part of an industrial project at the Fraunhofer Institute for Manufacturing Engineering and Automation (IPA) in Stuttgart. It was applied at a leading manufacturing concern in the building supply industry in southern Germany. The business employs 70 workers in the production of house doors. The production program can be divided into three varieties of products. The organizational structure in production includes six work groups which carry out the following work steps: lathe processing, preliminary assembly, final assembly, final inspection and delivery.

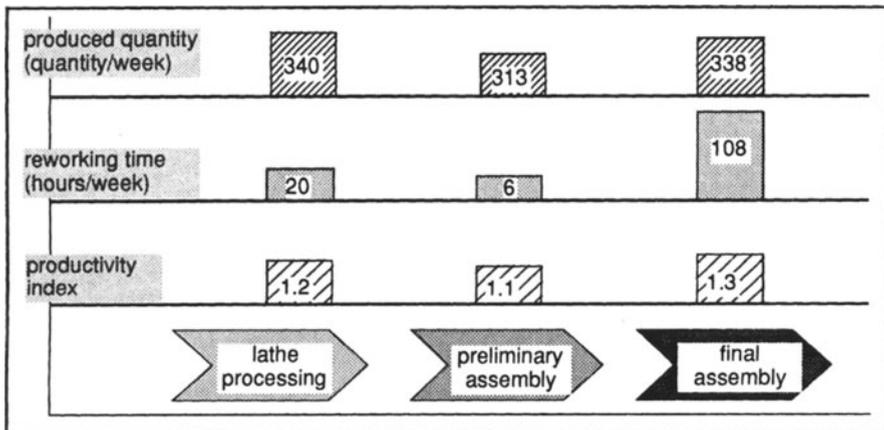


Figure 7: Comparison of production work groups within the company.

The project revealed rationalization potentials in technology and in organizational structures of production, little self-dynamism and weaknesses in the ability of dynamic adaptability. In order to break the rigid organization and process structures, a navigation process was gradually introduced, thereby creating suitable conditions for benchmarking.

First the composition of the work groups, tasks to be carried out, methods of measuring performance, and goals were defined. The efficiency of the respective group was measured by means of structured indicators, processed and visually available on a display board. Each employee received reports on the achievements.

In the next step a continuous improvement team was formed to increase the dynamic adaptability. Current performance indicators, problems in attaining performance goals and approaches to improvements were discussed in teams at regular intervals. The team was put together from employees of all production work groups and IPA-consultants. Representatives of the work groups had the task of passing the findings discussed by the team on to all group members, to apply them and at the same time to bring improvement suggestions from the work groups to the team. This procedure included on the one hand as many employees as possible in the dynamic adaptation process, and on the other increased the in-plant dynamics through small, responsive teams.

An internal comparison of work groups was carried out as first step towards benchmarking (see figure 7). A simple efficiency comparison was possible because the same indicators for all work groups - such as manufactured quantity, reworking times, quality, production costs and productivity - were defined. The findings of the comparison were discussed by both the work groups as well as by the continuous improvement team and numerous causes for the differences were immediately determined. It was possible to achieve an efficiency increase in the work groups through the exchange of internal "best practices" and common problem solving.

A comparison with national indicators within the branch showed that the company fared well against the industry average. Compared with international benchmarking partners, however, there was a definite performance gap.

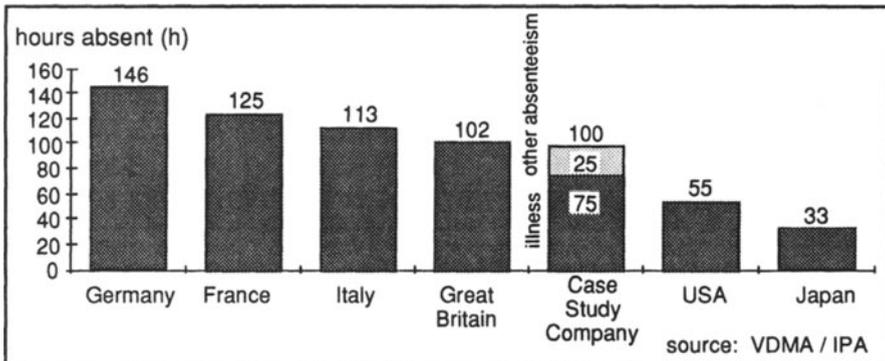


Figure 8: International comparison of absentee rates (illness, accident, etc.) per employee per year in hours.

The comparison was carried out with indicators from operational navigation and data from industry associations. This procedure represents an important step in the direction of more comprehensive and detailed benchmarking.

The practice confirms the advantages of connecting operational navigation and benchmarking. The project was able to establish awareness of the actual situation on all company levels. It increased open-mindedness for changes and accelerated targeted improvements.

6. BENEFITS AND OUTLOOK

The benefits of utilizing benchmarking in operational navigation can be divided into quantitative and non-quantitative components. In the application example of a medium-sized building supplier the following measurable gains in form of increase rates can be expected:

time reduction	> 40%
product cost improvement	> 25%
quality improvement	+ 20%

The non-quantifiable benefits are reflected in a higher motivation of employees. They promote creative ability as well as capacity for analysis, judgment and communication. Because they change from people concerned into active participants they become more committed to the company. This may result in a reduction of absenteeism and an increase in the amount of improvement suggestions.

In order to operate profitably more knowledge must flow into theory and practice and be successfully applied in the company. Benchmarking, the "strategic radar", which confronts the employees with outside realities, together with the operational navigation can initiate and guide this process.

As conclusion a piece of advice: "Begin benchmarking immediately at a vital, solvable problem with courage, a small team and the active support of the employees."⁷

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