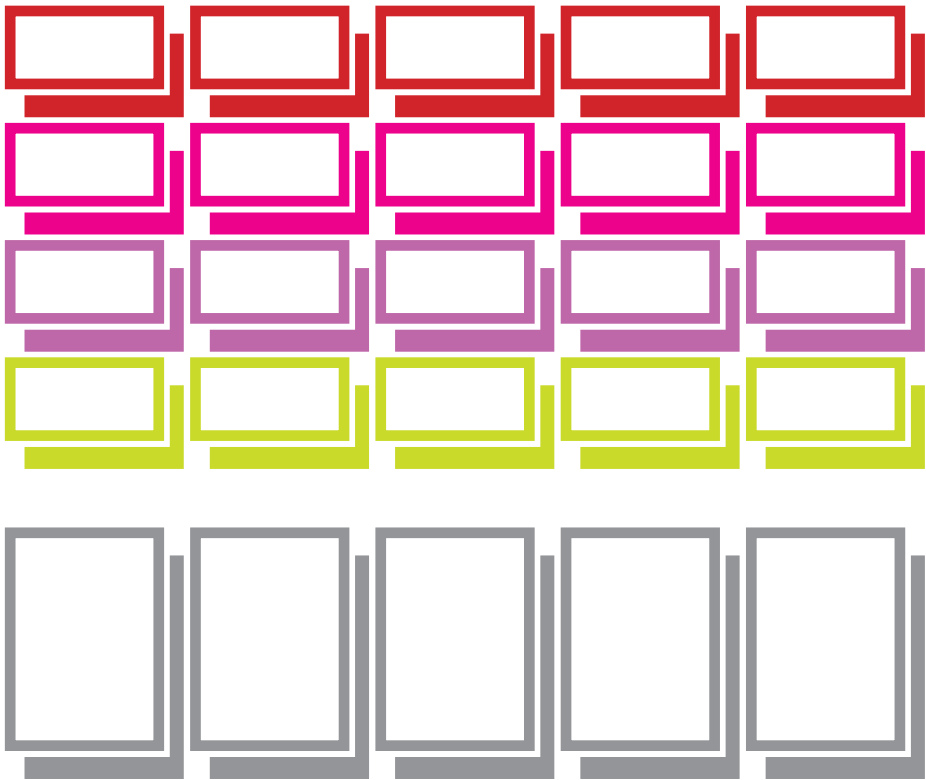


Modern Company Management in Mechanical Engineering



***Modern Company Management in
Mechanical Engineering***



***Modern Company
Management in Mechanical
Engineering***

Klaus Schwab - Hein Kroos

With assistance from the VDMA “Modern
Company Management in Mechanical
Engineering” working group



Published by
Verein Deutscher Maschinenbau-Anstalten e.V.
Frankfurt/Main-Niederrad

1st Edition 1971

**Copyright © 1971 Maschinenbau-Verlag GmbH,
6 Frankfurt/Main-Niederrad 71, Lyoner Straße 18, Postfach 71109**

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Graphic design: Ruth and Helmut Dornauf, Frankfurt/Main

Printed by: Kern & Birner, Frankfurt/Main

Binding: C. Fikentscher KG, Darmstadt

“No war, no strike, however long, no serious economic crisis can restrict the development opportunities of a national industrial sector as much as modern, more successful management methods in the hands of the competitive industries in other countries.”

With this statement Dr C.A. Meier-Windhorst, member of the VDMA Executive Board opened the discussion about modern management methods in mechanical engineering two years ago. At his suggestion, a working party was formed, which under the chairmanship of Dr Kurt Werner, Vice-President of the VDMA, considered the problems of management in our industry and examined the applicability of previously developed management methods. This book is the initial fruit of this work. It primarily addresses all those business people who have not been able to consider this complex of questions. It is intended to form the basis for future activities of the VDMA in the field of modern company management in mechanical engineering.

Verein Deutscher Maschinenbau-Anstalten e.V. (VDMA)

President

Chief Executive Officer



(Dr h. c. H. zur Nieden)

(R. Audouard)

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(as corresponding member)

Hein Kroos
VDMA, Frankfurt/Main

Paul Müssig
VDMA, Frankfurt/Main

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Introduction

This document is not intended to question your management abilities, but provides suggestions for considering your company and modern effective management methods from a different point of view. The prerequisite for this is your willingness to obtain information about new management methods and to apply these if they appear to be helpful. This study presents a management system which takes the special features of a mechanical engineering company into account. This cannot be a tailor-made solution, because the differences between different companies are too great. We must therefore leave it to you to make the necessary adaptations. The following test is intended to reveal several things about yourself. At the same time it highlights issues and problems discussed later.

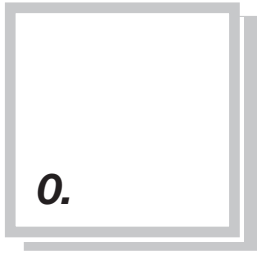
Test yourself

Do you know how much time you spend each day on different tasks (is a general time schedule available)?	Yes / No
Is your work primarily determined by your own ideas and plans and not by day-to-day activities?	Yes / No
Do you know your company's short-, medium- and long-term objectives?	Yes / No
Are all persons in management positions aware of your company's commercial targets?	Yes / No
Do you use at least half of your working hours for formulating commercial targets and developing strategies?	Yes / No
Do the staff in your areas of responsibility show initiative and are they innovative?	Yes / No
Do your instructions to employees only describe the objectives to be achieved instead of the work flow?	Yes / No
Does your company have so much to offer in terms of the promotion of initiative, further training and scope for personal development that even younger employees feel a sense of long-term commitment to the company?	Yes / No
Is the estimate of the company's position more future-oriented than backward looking?	Yes / No
Do you know the essential factors that will decisively change our environment in the years to come?	Yes / No
Do you have ideas (if possible, stated in writing) about how your company will respond to the changing environmental conditions?	Yes / No

Are you familiar with the management problems that are typical for mechanical engineering companies?	Yes / No
Do you have precise information about the strengths and weaknesses of your company?	Yes / No
Will your production range be able to meet your profit expectations in the long term?	Yes / No



If you have answered most of these questions with a “No”, it is vitally important that you consider the management system described here. Even if you mainly answered “Yes”, we recommend that you read on. Many things may be of interest to you.

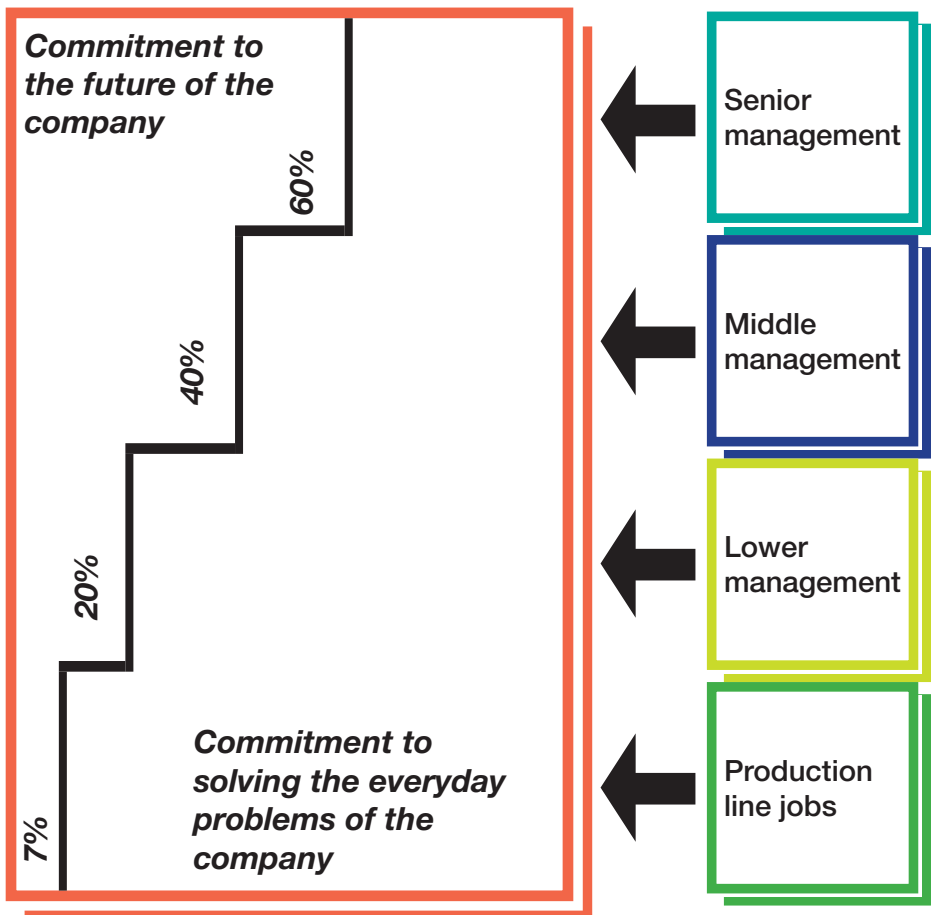


Leading the company into the future

The *elements* of successful company management are

- precise knowledge of the company situation, combined with the will to remedy existing shortcomings
- clear ideas about, what, how, when and where things need to be achieved
- implementation of these ideas in the daily activities of the company.

This seems to be self-evident. However, many companies are still driven by day-to-day events. Survival and growth are more or less left to chance.



Consideration of the future of the company (in % of working hours)

The diagram - a result of the analysis of working hours in successfully managed companies - schematically illustrates the proportion of working time at the individual management levels concerned with the future of the company. Result: The higher the ranking, the more time is spent thinking about “tomorrow”. It is likely to be interesting to compare this result with your own business practice.

The key to successful company management is consciously securing the future of the company.

This applies especially to mechanical engineering, which is dominated by rapid technical progress.

Only if top management systematically analyses “tomorrow’s” problems on an ongoing basis can the company’s survival and growth in a rapidly changing environment be guaranteed.

However, many entrepreneurs are of the opinion: “We are so successful because we work the way we always have!”

■ This attitude may have been true in the past, but it does not apply in the rapidly changing environment of today and tomorrow.

■ Success is often based on commercial acumen, in the early recognition of opportunities and risks. However, this is ultimately nothing other than an unconscious consideration of the future.

Even a modern company management cannot do without a good old-fashioned “gut feeling” – on the contrary, better attention must be paid to a company stance that intuitively feels right and is largely based on experience; it must be systematized and refined with the aids that are now available.

The creation of a modern management system (organized according to the chapters of this study) proceeds through the following phases:

1. Formulation of the company mission statement

The “mission statement” sets out the general principles and ideas which determine the company philosophy.

2. Environmental analysis

Every company is influenced by its environment. These environmental factors must be examined and their possible effects must be recognized.

3. Company analysis

An appreciation of the strengths and weaknesses of the company is decisive for future success. This requires an effective internal information system.

4.+ 5. Definition of objectives and strategies

On the basis of the mission statement and information from the business environment analysis, the corporate objectives and strategies are developed. These are the result of a conscious effort to:

- recognize and utilize opportunities
- avoid risks
- exploit, maintain and nurture strengths
- identify and eliminate weaknesses.

6. Preparing actions

Objectives and strategies must be implemented. They are implemented in everyday practice through

- employee management
- planning
- organization.



The following graphic illustrates how these phases are interlinked. It is also a guide through this study.

1. Company mission statement



2. Environmental analysis



4. Goals



3. Business analysis



5. Strategies



6. Measures

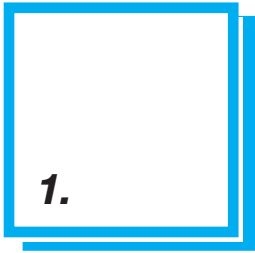
Personnel management

Planning

Organization



Actions



Formulating a mission statement

1. Company mission statement



2. Environmental analysis



4. Goals



3. Business analysis



5. Strategies



6. Measures

Personnel management

Planning

Organization

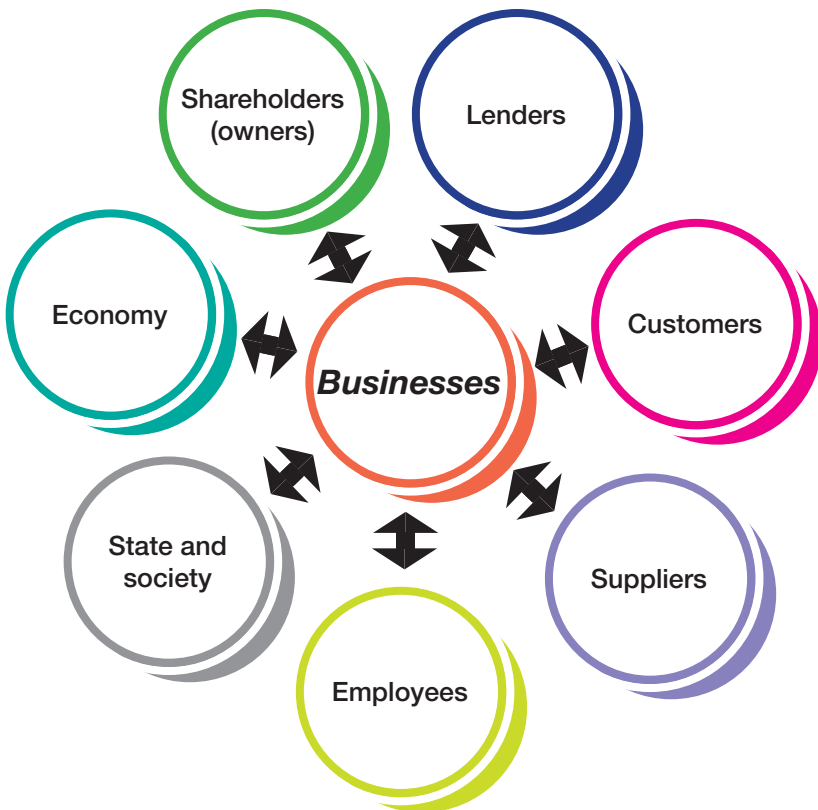


Actions

The viability and development of a mechanical engineering company is largely determined by how effectively it satisfies the often highly divergent requirements and wishes of its stakeholders.

The prerequisite for this is a knowledge of what factors influence the company's development process, what limits the management must observe, for example due to laws and regulations, what opportunities the management can exploit and what groups of stakeholders inside and outside of the company are affected by particular actions.

Informing the stakeholders about these interrelationships and explaining the principles by which the company acts is the task of the company mission statement, which is usually set down in writing and is available to all.



The company at the centre point of its stakeholders

Advantage: All stakeholders see that their expectations are satisfied to the extent reasonably possible - however it is made clear to them that they are a part of a “performance community” that contributes to the success of the company and that their wishes can only be satisfied in harmony with the justified expectations of all concerned parties. All the groups listed here have a direct interest in the success of the company:

Shareholders and creditors expect reasonable return on their invested capital in addition to a secure investment.

Customers expect a good product at a favourable price. In addition, in the mechanical engineering industry, service is especially important. This does not just start with the delivery of the machine, but rather with initial discussion of the project, because even at this stage, the producer must consider the customer’s problems.

Suppliers expect the company to be solvent. In addition, they have an interest in their customer’s success in the long term and that it continues to grow.

Employees expect a reasonable material reward for their efforts, as well as recognition and promotion. The best performance can only be achieved if employees are convinced of the value of their work and are offered individual opportunities for personal development.

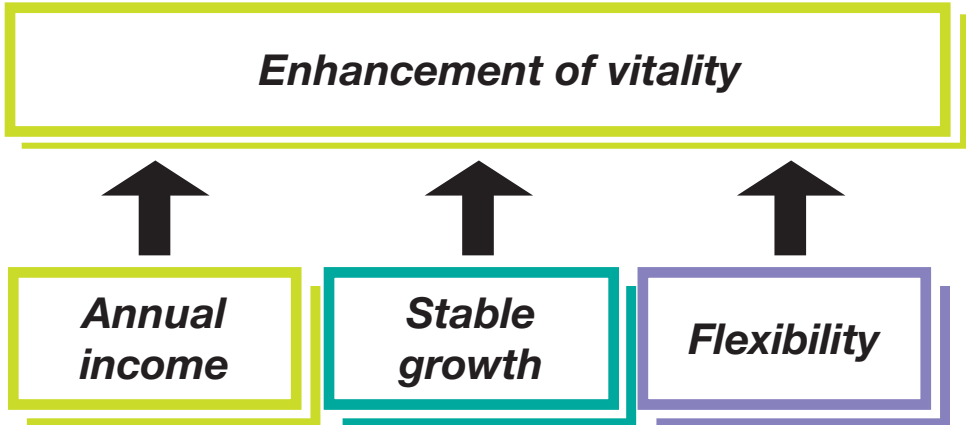
The wider economy, the state and society expect that the company will contribute to the improvement of public well-being in many ways (creating jobs, taxes, etc.).

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The mission statement must address these expectations, needs and interests. The company is like an organism, which depends on several arteries. These must all be nurtured, so they are always “healthy”. This is the only way that a company can survive and grow.

The principles of the mission statement are designed to underpin the vitality of the company as a safeguard for the future.

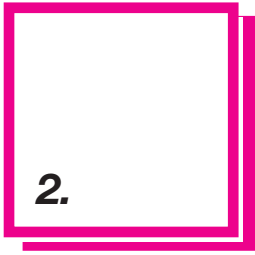
The prerequisite for the above is the generation of **regular and adequate profit**, with which growth-oriented investment, hedging of commercial risks and interest on the invested capital are assured. Profit, however, is not an end in itself. As a benchmark of the success of an individual company and the microeconomically optimum use of resources it fulfils an important control function - as is demonstrated by the success of the “social market economy”. This is contrasted with additional requirements: **stable growth and flexibility**, i. e. the ability of the company to respond to economic fluctuations, capital and liquidity bottlenecks, different production requirements, independence from certain customers, markets, etc.



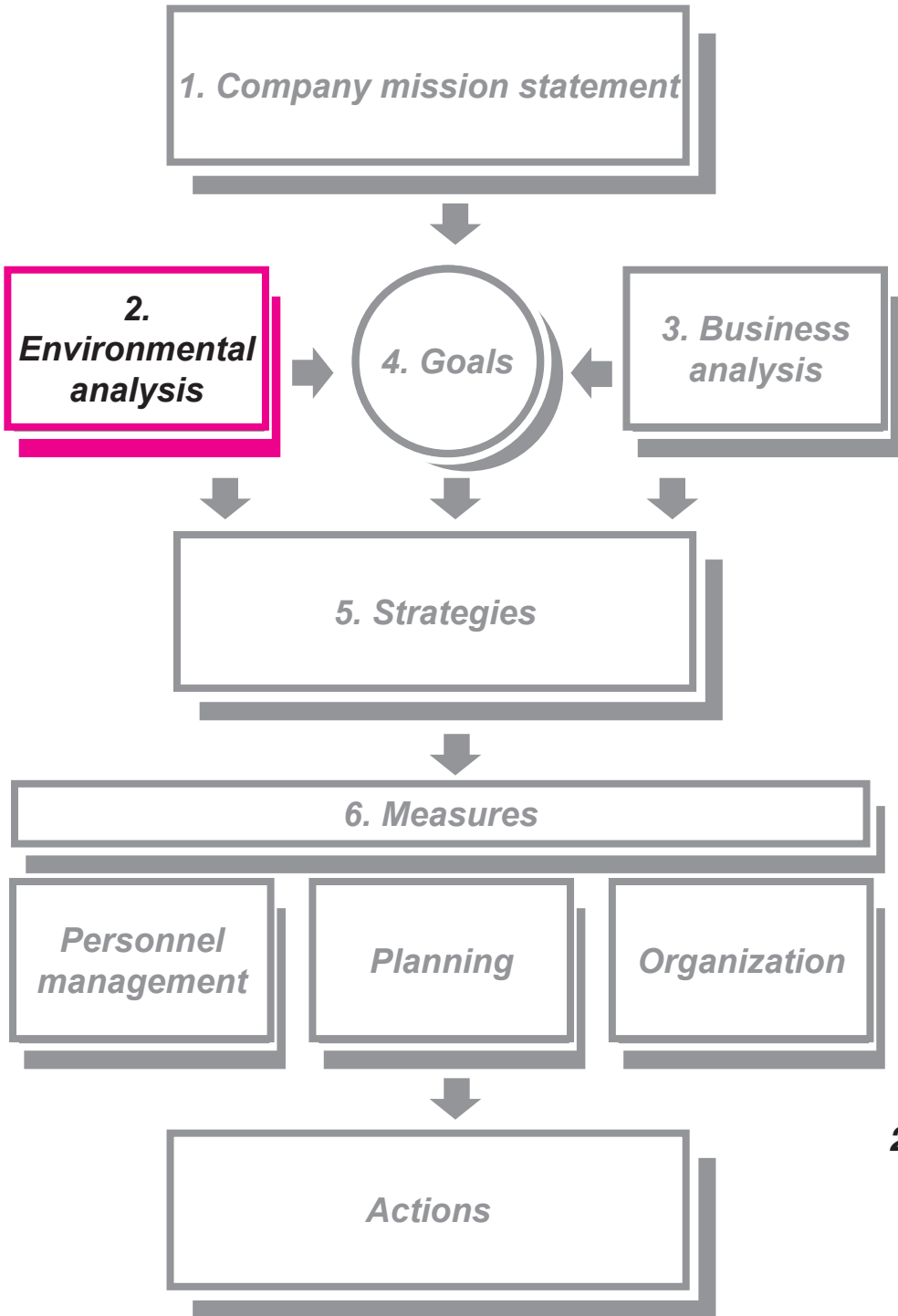
Prerequisites for the company's survival

These prerequisites are closely linked and interdependent. Frequently, it is only possible to satisfy one condition at the cost of the others. Therefore, continuous adjustment and continuous compromise are required. For example, annual income will be

reduced if extensive research and development projects must be financed to secure long-term stable growth. In another case, the income situation may be improved by the procurement of equipment for mass production, with a temporarily fixed range. On the other hand, due to the relative inflexibility of these production facilities, this cheaper production would occur at the cost of the ability to respond to changed production requirements.



Analysing the environment



Business environment variables

Every company is subject to environmental factors, which limit its freedom of action. On the other hand, this business environment is the soil in which every company grows. While that may be a widely accepted truism, what is new is that the rate of change in our business environment has increased and continues to do so. This presents great risks for the company. However, the opportunities to profit from rapid change are equally great. A company which keeps pace with the rate of progress in today's business environment, which responds immediately and which makes allowance for tomorrow's changes in its planning, has laid the foundation for future success. The greatest commercial priority in this context is:

Improvisation is replaced by well-planned, proactive and holistic thinking and actions!

Some changes which any management must expect today:

➡ The wide variety of issues in our social environment and their management (water and air pollution, transport, education, welfare, etc.) results in increased state influence in commercial activities. Although, on the one hand, this restricts a company's room for manoeuvre, on the other it opens opportunities to exploit growing markets and the development of existing or completely new engineering products. In future, competitiveness will increasingly depend on whether the company is able to offer products and services which meet changed needs and which fit into the economic, social, political and cultural environment.

➡ The results of accelerated technological progress are a rapid succession of new materials, products, energy sources and production techniques (semiconductors, lasers, electric discharge machining, explosive forming, non-ferrous sintering, etc.).

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Monitoring, registering and evaluating all the research results and new developments which are important for a company

(acquisition of know-how and licenses), as well as increasing in its own R&D activities are prerequisites for remaining in the market.

➡ Increasing political and economic integration is driving the international division of labour. Due to their wage levels, industrialized countries internationally are now only competitive to a limited extent in conventional manufactured products. The German engineering industry will increasingly assume the role of a producer of know-how. The competitive advantage to date is “custom-made” machinery and plant. The future competitive advantage is customized solutions.

➡ The “information explosion” inevitably leads to the use of result-orientated communication systems and equipment (IT systems) by management. Result-orientated means finding a middle path on the basis of the stringent selection of data: too much information processing causes excessive costs, too little means an inadequate overview of the environment and internal procedures in the company. Managing the large volumes of data will be a decisive competitive factor.

➡ People as individual personalities must increasingly become the focus of commercial attention. As the following illustration shows time, in the post-industrial society (assuming that the satisfaction of basic material needs can be taken for granted) will have a different value system.

Outdated values

- Satisfaction of material needs
- Work as a “virtue in itself”
- Strong ties with tradition
- Conformity
- Need for personal prestige

New values

- Satisfaction of ideal needs
- Work as a logical, meaningful activity
- Openness to new ideas
- Individual development



Environmental influences as opportunities and risks for the company

The “wheel of environmental influences” is turning ever faster. Management must also adapt more rapidly. For management, the following principle applies: do not live with the changes, but live from the changes.

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Tomorrow’s successful entrepreneur must therefore possess the following skills:

- The company does not end at the factory gate. The entrepreneur participates in political and social life.
- The entrepreneur does not see the company as a multitude of different parts, but rather perceives it as a whole, as a “system” in which everything is interlinked.

- The entrepreneur manages the staff in a psychologically appropriate manner and takes their personal characteristics and ideas into account.
- The entrepreneur knows that today's markets are not necessarily the same as tomorrow's, thinks in terms of the global market and always looks to the future.

It is very unlikely that an individual manager will possess all of these characteristics. It is precisely for this reason that management as a team is the way forward. The management team should not primarily be composed of the required specialists (such as the frequently conflict-prone duo of businessman and engineer so prevalent in the engineering industry), but rather the team as a whole should offer as many of the described management skills as possible.

This has the following result for company management in daily practice:

- ➡ The traditional, one-sided compartmentalized view of management tasks according to function, such as research and development, purchasing, production, sales, finance etc., is essentially inward looking, and prone to the lack of cooperation, especially if the areas of responsibility concerned are headed by managers with different qualifications. The top management should therefore
- be focused on the future
 - have an outward-directed stance
 - be organized so that the breaking down of divisional boundaries is assured.

This does not mean that the members of management should completely dispense with work in relation to specialist areas. What is essential is that they do not primarily perceive themselves as the representatives of the interests of their departments, but rather as managers of the "whole".

Prerequisite: The company is organized and tasks are delegated in such a way that the management has the time to pursue its essential management duties.

Methods for business environment analysis

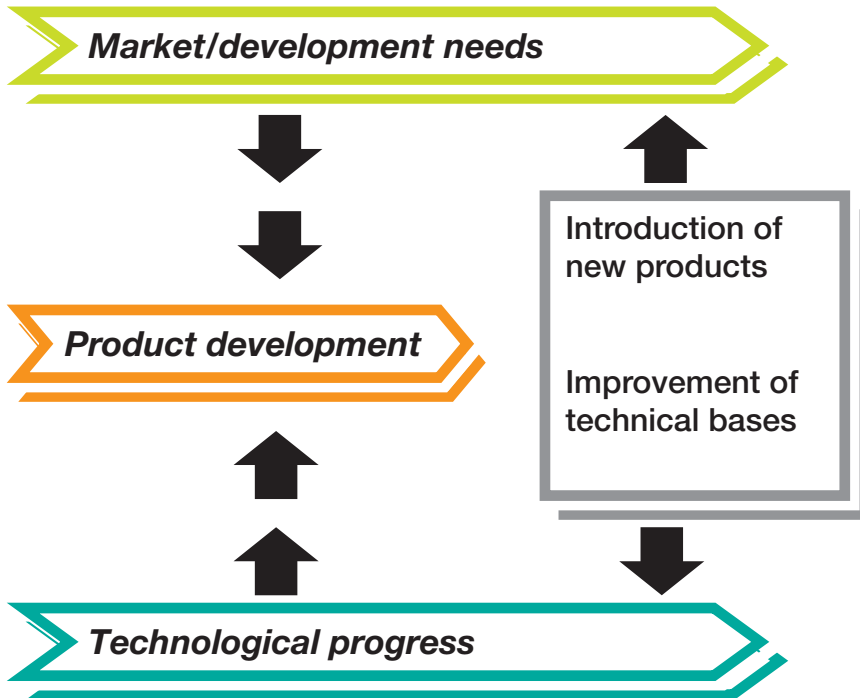
Until now only a few methods have been available for performing business environment analyses “by numbers”. The two most important concepts for the engineering industry are:

- technological forecasting
- the life cycle analysis

Technical forecasting

The prerequisites for the creation of new products are:

- an existing demand or the possibility of creating new demand
- the technical knowledge to develop and manufacture a corresponding product



Creation of new products

Technological forecasting is an attempt, with the aid of

- methods for predicting future market requirements
- methods for forecasting future technical possibilities, to determine what future demand in a particular product area can be satisfied on what technical/scientific basis.

Some scientific methods applied to support technical forecasts are:

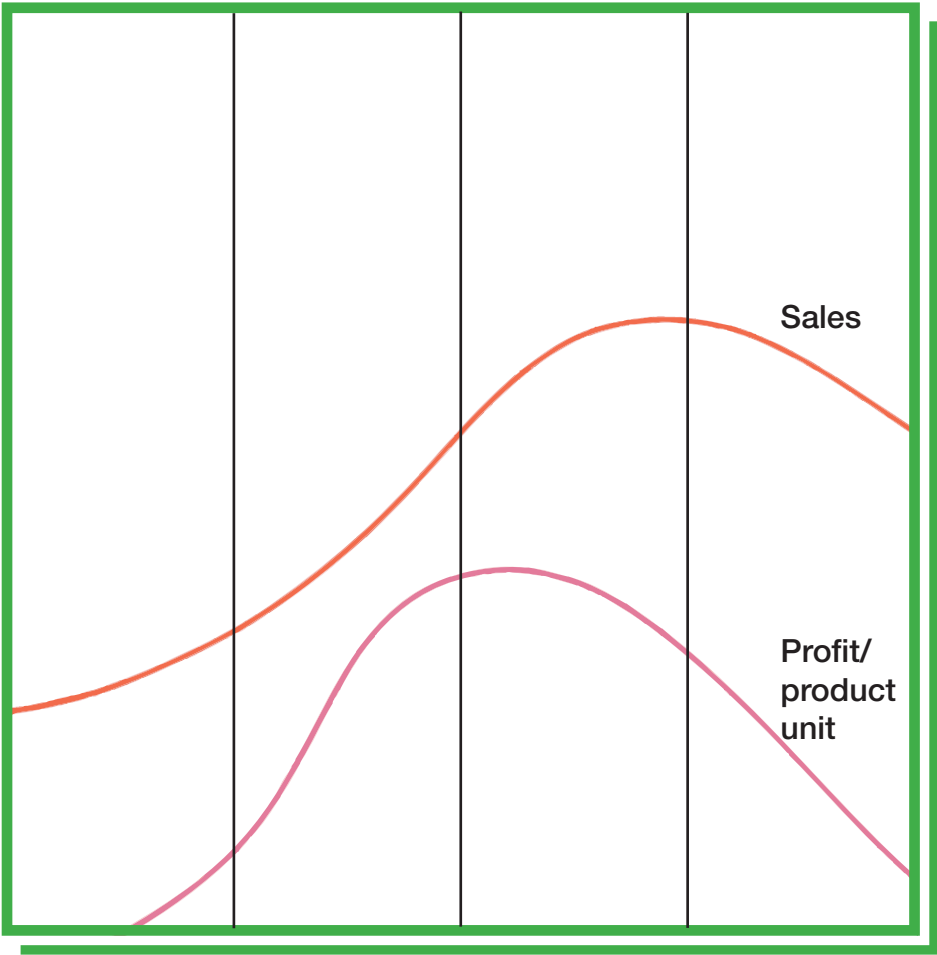
Relevance trees	➔	Decision-making system
Inductive identification of trends	➔	Identification of developmental trends on the basis of statistically verified projected values (e.g. population growth)
Correlation of trends	➔	Calculation of trends on the basis of variables
Integrated mathematical models	➔	Survey of interrelationships in a precisely delimited area

However, they are only applicable to a limited extent. Estimates of their practical applicability vary widely.

More important than the creation of a comprehensive technological forecast on a systematic basis, which requires relatively long lead times, is initially to identify the relationships which have been described, and by logical analysis to identify starting points for new developments, which are technically feasible and which will also be marketable.

The life cycle view

The life cycle of a product can be compared with that of a human being: Once the product has become established on the market after the launch phase (childhood), this is followed by a phase where there is a growth in sales (youth); after this the growth rates flatten out, the product enters a mature phase (maturity) and finally there is a regression (old age).



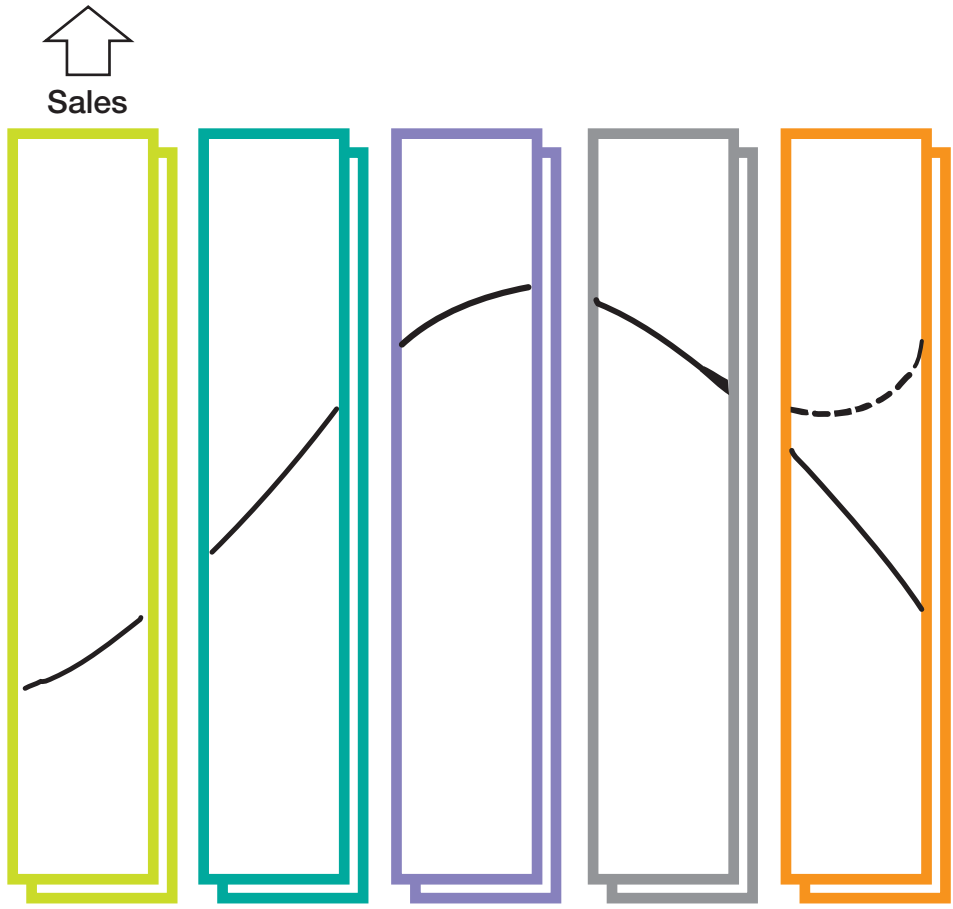
Time 



Schematic chart of the sales and profit curve over the life phases of a product

Features of the individual phases

<i>Launch phase</i>	No profit or little profit, as the launch is associated with large costs and uncertainty about the chances of success
<i>Growth phase</i>	Good profit opportunities, as the product is established on the market and there is a competitive advantage Typical seller's market, usually with a temporary monopoly position
<i>Mature phase</i>	The competition has either "copied" or has caught up due to the implementation of other solutions; tendency towards a buyer's market Prices squeezed due to reduced profit opportunities, severe competition, above all with additional services (conditions, service)
<i>Declining phase</i>	The product still has a steady market, but the market share reduces The product is obsolete and can only be sold with price concessions Ultimately the product cannot be sold at all



Launch phase

Machines for electrochemical material processing

Growth phase

Plastic processing machines, electronics, data processing systems, nuclear reactors, sinter presses

Mature phase

Classic textile and cutting machine tools

Declining phase

Sewing machines, steam locomotives

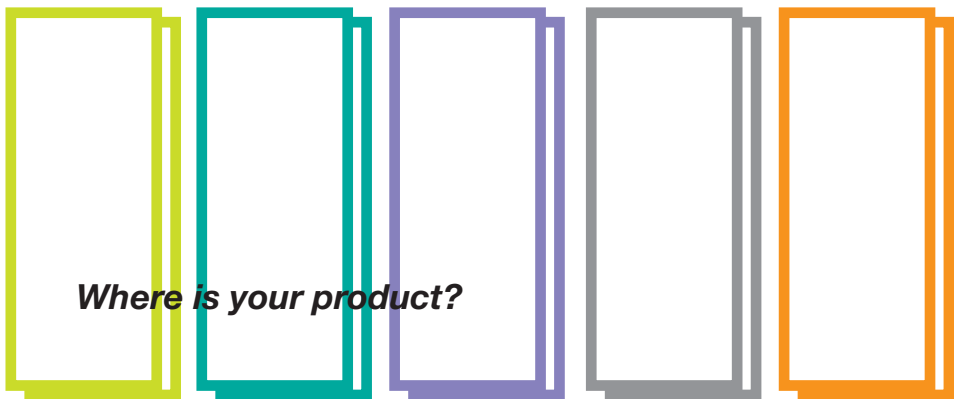
Come-back

(by creation of new uses)
Bicycles, DC motors

Product groups in various phases of life

This life cycle curve view is a model analysis. Its weakness is that the model presents an “idealized” view of reality. For example, the sale of a product can be greatly influenced by economic developments, the individual phases of life cannot be clearly separated from each other or the duration of the respective life phases is difficult to estimate at the outset.

In spite of these weaknesses, the life curve analysis can serve as a useful basis for the formulation of targets and strategies. The condition for this is that the company management knows approximately “where” each of its products stands, without succumbing to self-deception.



Here, the life curve view has been used as a method for business environment analysis. In spite of all a company’s efforts to create and keep a product viable, the course of the curve is primarily determined by environmental events (market demand, competition, new technologies, new raw materials, etc.).

Introduction of environmental analysis in the company

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■ Regular meetings of the management committee (in an atmosphere which is as relaxed and as free from possible distractions as possible) involving everyone who is “close” to the market and can therefore provide valuable information (for example, heads of local sales offices).

- Exchange of ideas (brainstorming) on the basis of a list of questions, in which each participant may “think out loud” and unconventional inputs are desirable.



Answer the following questions on the basis of a check list:

Product life span

Where are the products in the present range on the life cycle curve?

- Products which are competitive at the time of review and which will remain so in the foreseeable future.
- Products which require review with regard to quality improvements, cost structure and future sales opportunities.
- Products which will need to be replaced in the foreseeable future due to more efficient and economical innovations.

Market opportunities

- What trend (sales/profits) can be expected?
 - What are the most important factors which determine sales and profits (sales volume, quality, price, service, distribution, market and competitor behaviour)?
 - Which of these factors can be steered?
 - Which weak points can be eliminated?
- (Dependence on large customers, sectors and markets as well as “key people” in sales, design, etc.)

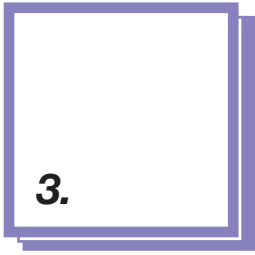
Technical progress

- What product developments or improvements may enter the market due to technical innovations?
- What changes in the production process will result in cost savings and therefore greater competitiveness?
- Which technical and technological solutions provide approaches for new product developments?

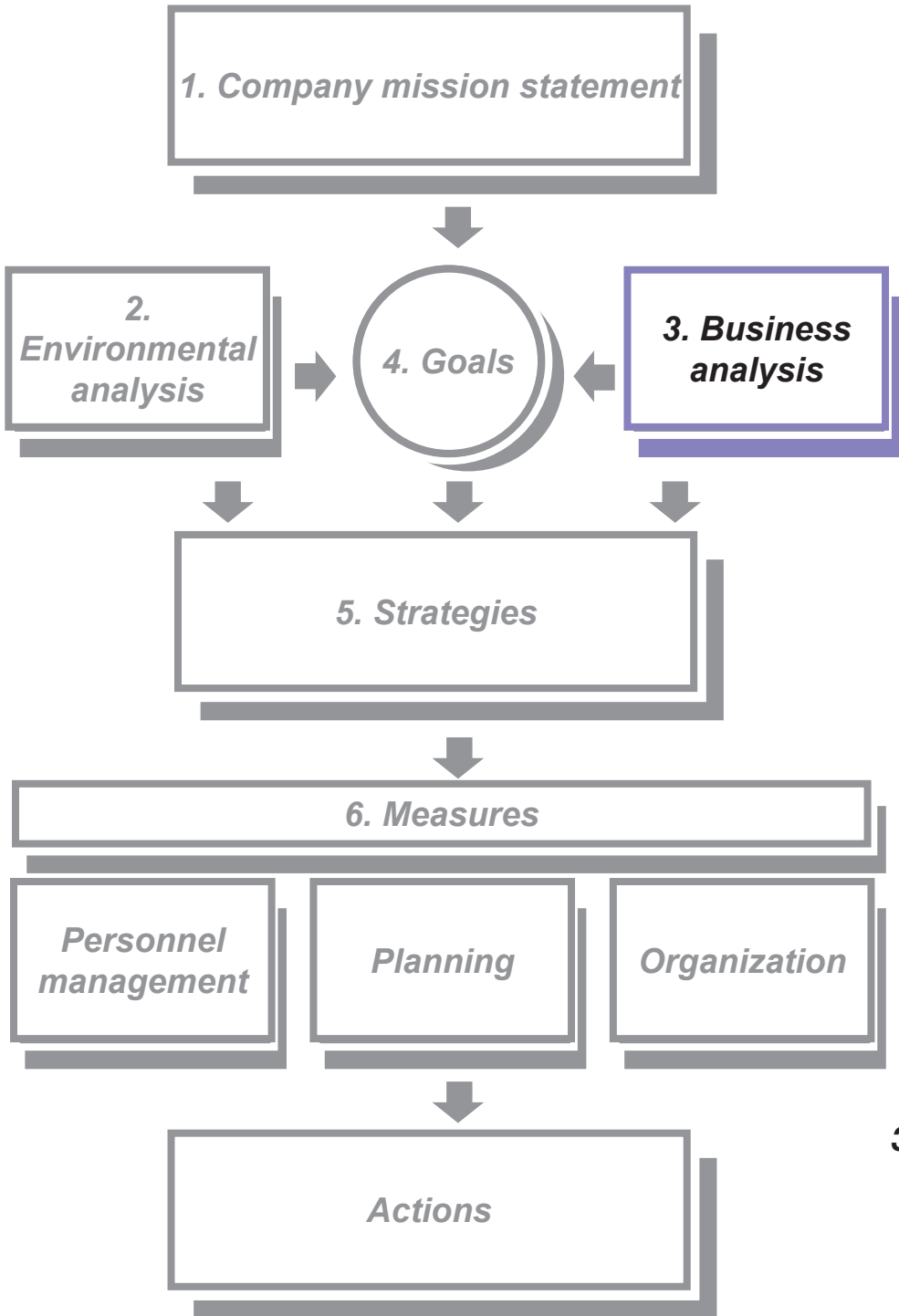
Influence of the state and other institutions (e.g. unions)

- What possible actions by the government or other institutions have a direct or indirect influence on the success of the company?
- What effect do global political changes, the creation of new market forms, new commercial policies, etc., have on the company?

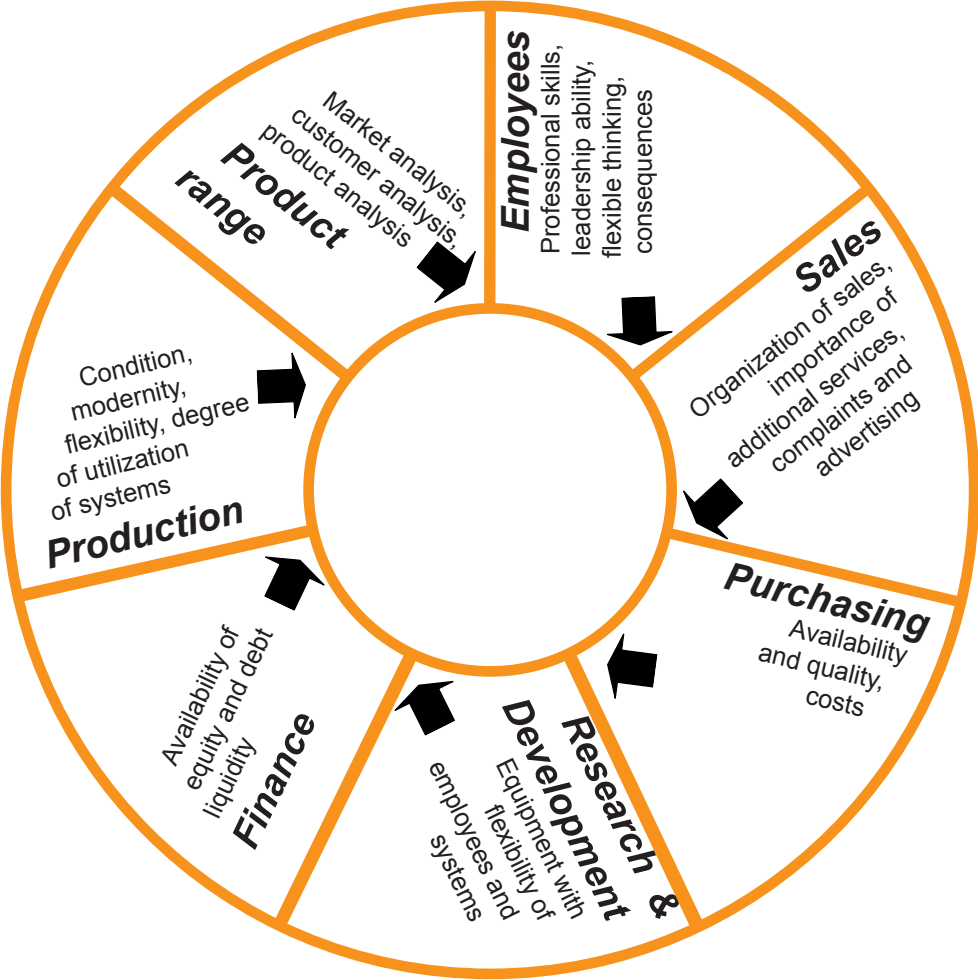
Each management team should produce a “customized” list of questions according to its specific situation. The main thing is that the individual factors should not be isolated, but rather that their interaction is registered.



Analysing the company



The environmental analysis is used to identify the external opportunities and risks which affect the company. In contrast, the company analysis should reveal the internal strengths and weaknesses. The following diagram shows the areas in which these may occur.



Determining factors for company success

Information about the company is usually easier to obtain than information about the environment. For this reason, the company analysis is usually better structured than the environmental analysis. However, the assessment of internal information about the company is often restricted to noting “what was” and “what is”. Management mostly only acts if the company does not perform as planned, if there are undesired changes in KPIs (Key Performance Indicators) or in performance stats. If the damage can still be remedied, this is usually associated with high costs. Early identification of the “weak points” could possibly have prevented the damage.

In addition to an analysis of the past and the present, a “future analysis” must be carried out.

This is based on the following questions:

Why is it like that, and how should it be?
What alternatives are there for reaching the desired target?
Which alternative is the best one?
How much effort would be required to implement this alternative?

The main emphasis and difficulty of *quantitative company analysis* lies in determining the contribution of the various divisions of the company or the individual products to the success of the company. A particular problem is to attribute costs to a product so that a realistic, and not a bookkeeping picture of the costs is produced. In addition, only quantifiable aspects are examined. Important factors such as the dedication and skill of employees or the results of research and development can only be partially assessed in terms of measurable variables and require further consideration.

The following factors, which cannot be definitively expressed in figures, highlight the necessity for a *qualitative analysis of the company*:

- ➔ Image of the company's organizational form
- ➔ Working atmosphere
Management style and competence
- ➔ Departmental egoism
Team work
- ➔ Traditionalism
Creativity

An important result of this analysis would, for example, be a time schedule, in which management's valuable time is assigned to priority tasks. Too often, management spends too much on unprofitable products and areas which are only "nurtured" for reasons of tradition or prestige. The time and resources are then lacking in areas where greater success could be achieved with new products or services and considerably less effort. Just as with environmental opportunities and risks, the strengths and weaknesses are identified by "brainstorming" the management team. From experience, the first result is the recognition of the necessity to develop a better reporting system.

The basis for the *internal reporting system* are the

- divisional statistics
- specialist documentation
- results of market research
- reports from markets, representatives and customer service
- correspondence with customers (e.g. complaints, suggestions).

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The following distinctions must be drawn:

- Information to verify completed changes in the individual company divisions
- Information for further planning.

If all of the divisions of the company with their mutual dependencies are integrated in the information system so that the information which is needed for management decisions can be accessed at any time, this is referred to as an “integrated management information system”. Objectives:

- Acceleration and improvement of the commercial decision-making process with inclusion of alternatives
- Optimum harmonization of partial objectives with the overall objective
- Better overview and more rapid recognition of the effects of individual decisions on all areas of the company

Regardless of the level of detail of the future information system, reliable key figures for the detection of expected deviations from a plan must be identified, which enable the management to intervene in good time. One approach, for example, would be to create a matrix of KPIs that include all of the variables which affect profits.



Setting goals



The principles of company policy formulated in the mission statement (Chapter 1) and the information from the business environment and company analysis (Chapters 2 and 3) must be applied to develop specific targets. With these, the management specifies what has to be achieved where and when. These are binding for the employees and accordingly must be discussed with them before they are finalized.

The goals should be realistic, i.e. feasible and clearly explained and – if possible – quantified.

Firstly, the long-term and short-term business objectives must be formulated.

The following list of key words could serve as an initial guide in defining company targets:

Company form and structure

- Company management system
- Organizational structure
- Planning, audit and assessment methods
- Cost structure (type, amount, elements, changes)
- Corporate structure

Sales

- Market position
- New sales areas and methods
- New products or problem solutions (sale of systems)
- Improvement of existing products or services
- Phase-out of products or services (rationalization)

Production

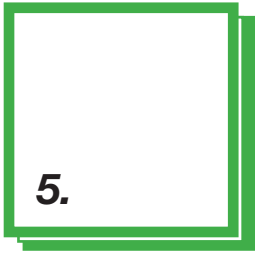
- New processes and new technologies
- Capacity issues (expansion, replacement, rationalization investment, “extended workbench”)
- Supply of materials (own or external supply, independence from certain suppliers, stock turnover, stock levels)

Personnel

- Structure
- Employment policy, employment conditions
- Training of next generation staff
- Employment situation, adaptation of permanent workforce to economic fluctuations
- Wages and salaries, social benefits
- Management methods
- Performance incentives
- Working atmosphere
- Relationship to unions

Finances

- Profit (used to improve the capital structure, preservation of assets, financing of investments, hedging of business risks, etc.)
- Liquidity (income and expenditure policy)
- Financing (self-financing, equity and external financing)
- Investment policy and holdings



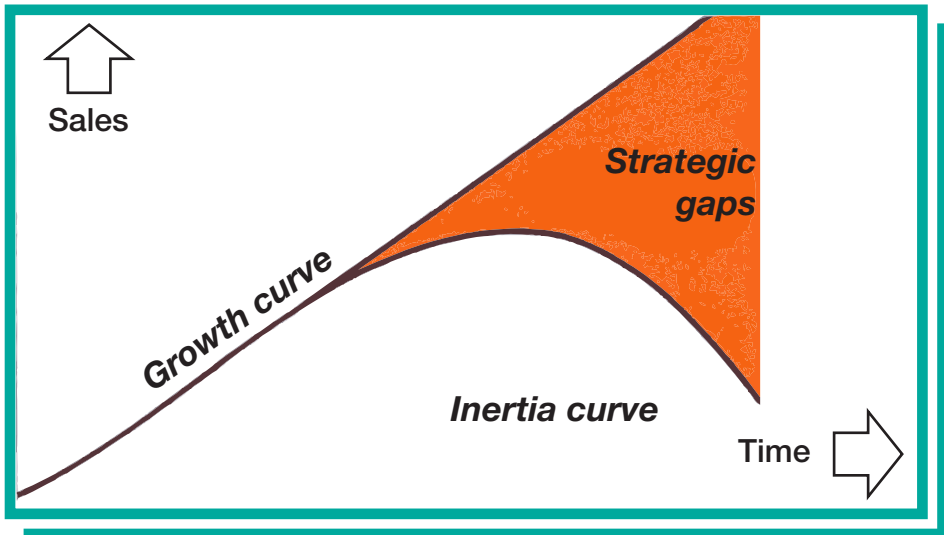
Developing strategies



On the basis of the information from the environmental and company analysis as well as the specified targets, ideas for the realization of these targets must be developed. These are fleshed out by the development of strategies.

All strategies are centred on the need to assure the company's continued vitality and to safeguard its future.

In the long-term view - which is typical in the engineering industry - this depends on achieving long-term, stable growth, taking the above subsidiary factors into account. The formulation of corresponding strategies for growth starts with the question of how the company would develop if all of the future opportunities were exploited. In the following diagram, this "ideal growth curve" is compared with the "inertia curve":



50

— Growth — Maturity — Decline —

Growth and inertia curve

On the inertia curve, although sales continue to increase after the growth phase (maturation process of the products) after a short period of stagnation a shrinkage process starts, which can ultimately lead to the company's failure. If the company management had not "left everything as it was" at Point A - the end of the growth phase, but rather had overcome its "inertia" and "switched to growth" by means of an appropriate strategy, the "strategic gap" would have largely been avoided.



The following growth strategies are conceivable for an engineering company:

Growth strategies

Expansion strategies

Growth without change to the range of services (products and services)

E1

Gaining new customers for existing products

E2

Further development of existing products

Diversification strategies

Growth by change to the range of services (products and services)

D1

Adoption of products associated with the system

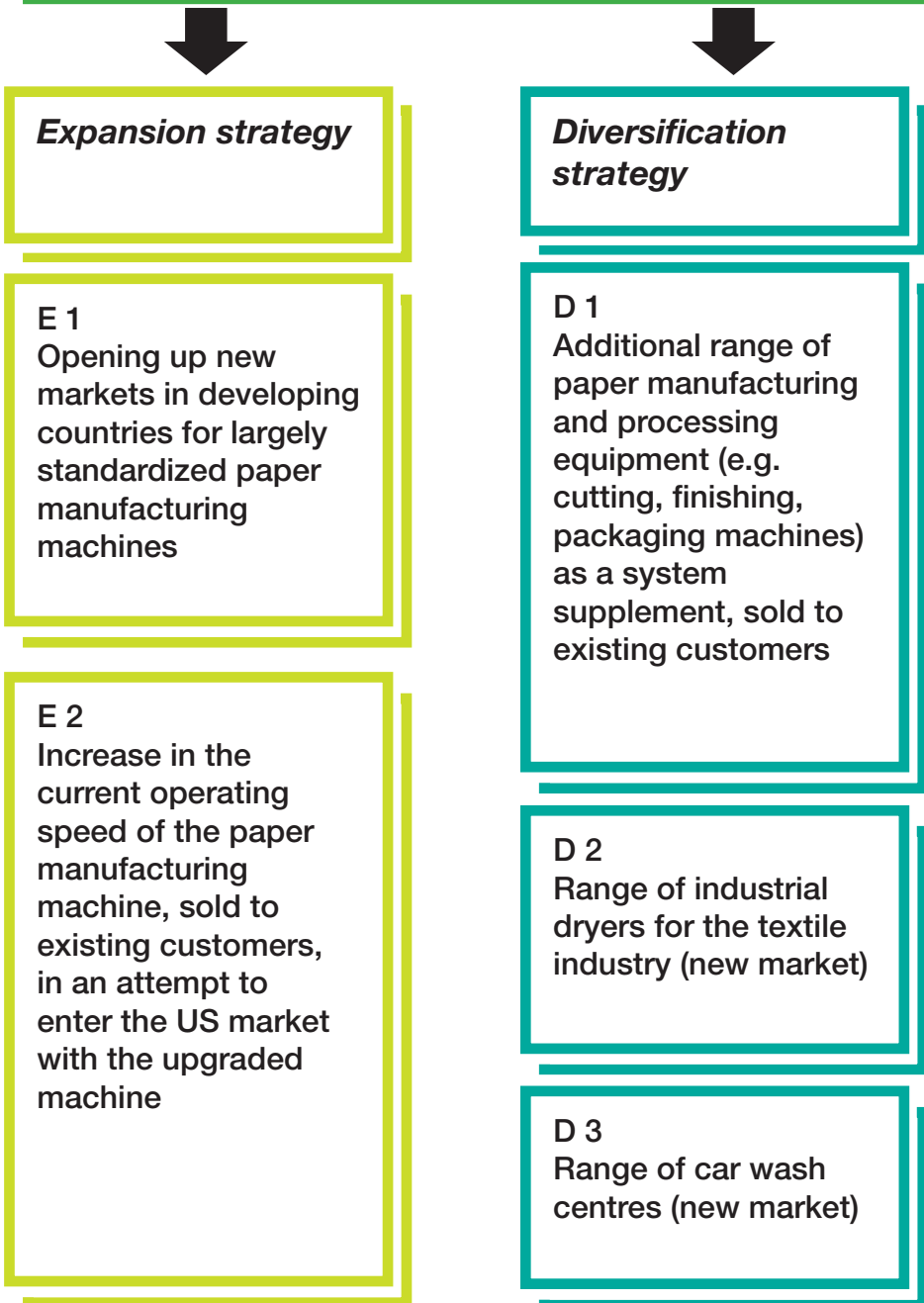
D2

Adoption of products with similar functions

D3

Adoption of products from outside the company

Growth strategies of a paper machine manufacturer



Practical example from the paper-making machinery industry

Expansion strategies

For E1: Acquisition of new customers

The increased interdependence of the global economy, as well as growing domestic markets continuously throw up new sales opportunities. If these opportunities are not exploited, a stagnating company will be squeezed out in the long term by competitors:

Growing markets demand expansion of the customer group and more intensive selling to existing customers as a prerequisite for maintaining competitiveness.

A company which wishes to ***retain its market share*** must grow at least as strongly as the average for its sector. The prerequisite is increased production quantity, which often requires the expansion of production facilities, tying up more capital.

With increased production, manufacturers of series or mass-produced goods are usually able to reduce their unit costs, so they can improve their quality and service or reduce the price. However, similar behaviour by competitors often results in fierce price competition, which depending on the severity and duration of this competition can squeeze profits or even cause losses.

However, the situation is different for producers of individual machines or plant: In this case, competitiveness and growth - even in expanding markets - is primarily determined by how well (know-how) and how comprehensively (system products) the company is able to provide solutions to its customers' problems.

If a company wants to ***increase its market share***, it must grow faster than the average for its sector. Possible prerequisites and consequences:

- Investment in equipment and highly qualified employees
- Increased capital requirement (self-financing, equity and external financing)
- Changes to the production range by concentration on the products with the best prospects of success
- Increased sales efforts
- Defensive measures by the competition, whose market share is being reduced
- Collapse of the price level in the industry due to predatory competition
- Reduction in short-term profit opportunities
- Decreasing flexibility due to increasing size of the company
- Temporary or complete elimination of competitors

As the German engineering industry's high exports clearly show, the market for engineering products is truly global. In addition to the well-known advantages, this also results in problems, which an export-oriented company must be clearly aware of:

- Necessity for continuous monitoring of foreign markets and analysis of competitors (market share, products)
- Additional costs due to secondment of employees abroad (training in foreign languages, relief and stand-ins in the company), creation and expansion of the customer service network (spare parts service, consignment warehouse, etc.)
- Difficulties in serving export market due to currency fluctuations, long delivery times, longer payment dates, setting quotas during economic upswings, etc.
- Increasing commercial risk with the increase in proportion of exports (due to parity fluctuations, political risks, financing problems for long-term production)

- Changes to size of operations and production runs as well as the company structure in order to maintain export ratio
- High additional expenses for adjusting products to the technical regulations of foreign markets (test regulations, standards, etc.)
- Lack of continuous demand (temporary saturation of the market, e.g. for power stations, large-scale plant, etc.)
- Financial and personnel capacity tied up due to large export orders (cooperation with carriers, export credit insurance, banks and institutions in foreign countries)

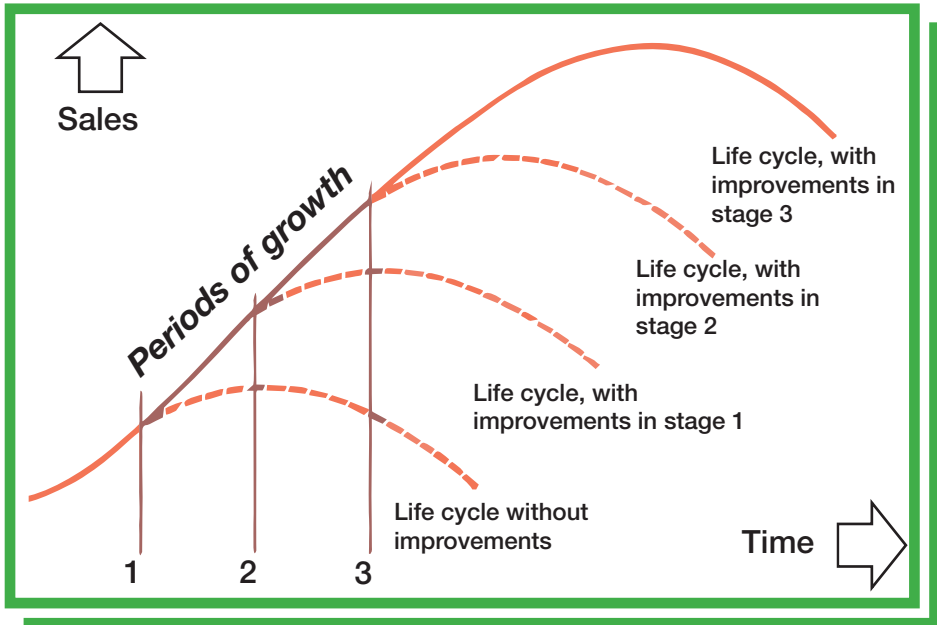
For E2: Further development of products

Expansion by further product development is often almost “automatic”: Due to increasing pressure from competitors, the company is forced to continue the development of its products, without the management exercising conscious strategic control of this process.

What this means for the development of engineering products can be seen from the example of the lathe: Advances in the field of powder metallurgy and later oxide ceramics enabled ever higher cutting speeds. This inevitably meant that the speed and rigidity of the machines had to change. Although the “lathe” still has the same name as ten years ago, there have now been so many qualitative and production engineering improvements, that only the basic functions are still the same.

Changes of this type extend the growth phase of the product life cycle curve and accordingly its overall course. As profits increase, especially in the growth phases, this improves the income situation.

For the further development of products, this profit aspect is an **55** additional incentive, which only tails off if the expenditure on development becomes too great.



Example of a life cycle curve with an extended growth phase

After the product launch, efforts for maintaining or expanding the market share concentrate on improving the product.

The greater the competition in the market, the greater is the necessity for rationalization (reduction in price) in product manufacturing. In general, productivity improvements result in higher output; this is the phase in which the life cycle curve flattens out (maturity phase, see illustration on page 34).

Although sales opportunities are reduced, capacity is further expanded - the same applies for competitors. Result: tougher competition, increased price pressure.

The downturn in the life cycle curve (decline phase) can be attributed to:

- Market saturation (Example: the demand for calendered film can be covered by installed calendering plant)
- Changes in demand (Example: no, or only a few calendered films are required)
- Substitution of predecessors (Example: plastic film is produced by extrusion and no longer by calendering)
- Material substitution (Example: calendered film is produced from a different material, for which the calendering machine can no longer be used in its existing form)

Conscious continued development of products is vital in the engineering industry. Accordingly, the company management should preferably focus on products with sufficient scope for growth.

However, the following should also be considered:

Product development may never become an end in itself (constant value analysis and control are required)

Success comes before sales – no further product development without a realistic estimate of the market impact (comparison of the expected additional costs and income)

With new versions of products, the inventory of spare parts increases (more capital tied up)

Diversification strategies

For D1: Adoption of products associated with the system

Previous focus in engineering industry: custom machines.
Development trend: System products, i.e. combination of machinery and services with the aim of offering the best possible solution for a production problem.

Possible benefits:

- Competitive advantage
- Securing of long-term sales
- Reduction of production risk due to changed service structure

Examples:

“Bread roll production” process

From the product “oven”. Development of the “bread roll production system”, which includes “roll production” by weighing the flour, dough kneading for fully automatic baking, packaging, and, where appropriate, freezing and heating.

“Concrete production” process

From the product “concrete”. Development of the “concrete production system”, which includes weighing, mixing, transporting and pouring.

For D2: Adoption of products with similar functions

Another form of diversification is the adoption of products and services, which from the point of view of the solution to the problem are similar or have a similar function to the previous range.

Possible benefits:

- Use of existing production capacities
- Application of company know-how
- Spread of risk due to opening up of new markets

Examples:

Extension of the product group “centrifugal pumps” with the “water turbines” product group.

Production of machinery for processing plastics, as well as woodwork machinery.

For D3: Adoption of products from outside the company

Extension of the range to products which do not belong to the respective industry is known as “pure diversification” although lack of knowledge of the market and lack of technical know-how often result in start-up losses; however, in the long term, the following benefits are conceivable:

- Extensive transfer of risks due to supplying markets, which are independent of each other
- Avoidance of dependencies on suppliers and customers
- Improvement of prospects for success by penetration into sectors with the greatest growth rates

Examples:

A tool manufacturer making containers.

Acquisition of breweries by heavy machinery manufacturers.

A construction machinery manufacturer operating a hotel chain.

By diversification the existing range of services is “systematically” extended and supplemented. The company attempts, for example, to extend the range of products and services so that the new combinations of products/solutions result in the best possible solutions for the customer and therefore a specific competitive advantage for the company. With this combination of services, higher revenues and income can often be achieved by the offer of stand-alone products/services. This is because: The result is greater than the sum of the individual performances, $2 + 2$ is more than 4. This effect, which occurs due to coordinated cooperation between the parts of the system, is known as “synergy”.

Synergical thinking opens up new possibilities, above all in the following areas:

- Management (“management by systems”)
- Research and Development
- Purchasing
- Production
- Sales (“systems engineering”)

The synergy effect comes into play with the “adoption of system-relevant products” (Strategy D1), primarily via sales and with the “adoption of functionally similar products” (Strategy D2) in research and development. The “adoption of products from outside the company” (Strategy D3) has almost no positive effects of the type described.

There is also such a thing as “negative synergy”. This can occur, for example, if a producer of large custom-made industrial plant enters the domestic appliance sector. The company cannot usually meet the requirements of the new business with its existing organization, which especially in production and sales is oriented to custom-made products. The necessary “re-learning” process is generally very expensive, as often mistakes cannot be avoided in the unfamiliar field of activity.

Growth and company size

Depending on the features of the offered product, the existing demand (or that which is to be generated), the structure of the sector and the intensity of competition, the conditions for optimum company size differ greatly.

All growth strategies require consideration of the necessary size of the company. The minimum objective of “securing market share” depends in case of increasing demand, for example, on an expansion of production and an extension of product range in order to maintain competitiveness.

The criteria for minimum size are, among other things, certain economic quantities for the manufacture of series production items, or a certain “minimum” market share for the production of custom-made machines.

The respective “critical minimum size” can often only be achieved by increased investment (in personnel and production facilities and of capital). It must therefore be ensured that the long-term availability of these resources is assured.

Many companies, for example, only want to grow in line with their growth of earnings, but they are forced by the market to grow to a size which exceeds their internal capacity for growth. For example, German engineering companies which are increasingly serving the global market, see themselves forced to expand their production if they wish to hold their own in the international competition for market share.

As the rejection of orders not only leaves the “door wide open” for the competition, but also eliminates the possibility of any follow-up orders, some companies have developed strategies to expand their market share, without increasing their production capacity. They transfer areas of production to manufacturers at home and abroad, with the purpose of “extending the workbench” or grant licences to foreign companies who operate under the brand of the original manufacturer.

In the first instance, the advantage of a larger production line may be lost under some circumstances. Secondly, there is a risk of losing expertise, but this can be addressed to a large extent through systematic development and the resulting competitive edge. Companies that pursue such strategies often focus solely on final assembly and customer service, to maintain contact with customers, which is essential for further application development.

Before selecting a strategy, it must be considered with a view to whether growth can occur with or without resizing the company.

If, for example, the existing product ranges or individual products are maintained, which is known as *product loyalty*, growth is usually possible with simultaneous extension of operating variables (Strategies E1 and E2) – if the limitations of the extended workbench, licensing and the better use of existing capacity by categorizing and standardizing boards and components are disregarded. Fixed assets and current assets are increased, and the capital base is broadened. Often, the funds required by this company cannot be generated by a single company.

One way to reduce costs and therefore to decrease capital demands is to partner other companies (development, sales and distribution, etc.).

However, the cooperative efforts of medium-sized and smaller companies are not usually very successful, as the demands of the potential business partner are too high. Difficulties also arise in negotiations between similarly sized companies, because they do not like to jeopardize their existing reputation that they have gained on the market and in the industry.

Another alternative is to merge with other companies, which often generates increased performance in key business areas – in addition to improving cash flow – large production runs can be produced more cheaply and cost effectively, due to rationalized research, and can be sold through a well-organized distribution network. As a consequence of the combined size, economic fluctuations are less severe, and can be compensated for more easily.

A major disadvantage of mergers is that the previously independent companies lose a large proportion of their independence. Their business is incorporated into a relatively “cumbersome” bureaucracy, in which the reduced flexibility and risk-tolerance of a large company prevents short-term adjustments to changes in the market, and profit opportunities are correspondingly reduced.

In this case, the most important tasks of the management team are to counteract any rigidity, to increase business processes transparency, and to shape the exchange of instructions, information and feedback in a systematic and rational manner.

Growth without resizing is possible, for example, with the transition from *product loyalty* to problem solving (system supply). The producer offers solutions which are specifically tailored to the customer’s problem, as opposed to individual machines (Strategy D1, see diagram on page 52). It thereby broadens its range of products and services, without expanding its overall capacity. System-based cooperation usually gives rise to longer-term business relationships.

This strategy is mainly employed by companies that want to maintain their average company size, because they regard it as more agile, manageable and controllable. However, the structure of the range of product/services requires highly-skilled, creative and flexible staff.

Accordingly, the implementation problems lie primarily in the development of a leadership style and the application of those organizational principles which make the company more attractive to employees (freedom of movement and career development opportunities).

Selection and formulation of strategies

Before the strategies with the highest growth potential are selected, their feasibility must be examined.

The following must be considered:

- existing capital resources or external financing
- environmental risks and opportunities
- strengths and weaknesses of the company
- positive and negative synergy effects
- reconciliation with the secondary objectives of “short-term success” and “flexibility” in order to limit risks
- critical business size

To accelerate the process, preparatory work (information gathering and processing) can be delegated to staff units. However, the management must be involved in analysing information, and developing and evaluating alternative suggestions. Only in this way can it be guaranteed that the management is fully informed when strategic decisions are made that determine the company's future.

The responsibility for selecting strategies cannot be delegated by the management and must be integrated in the strategic plan (with no rigid form, no overloading with figures and statistics!). It verbally expresses which growth strategies will be used by the management, in which combination, and how, when and where.



6.

Preparing an action plan

1. Company mission statement



2. Environmental analysis



3. Business analysis



5. Strategies



6. Measures

Personnel management

Planning

Organization



Actions

Switch-over points for the implementation of strategies in daily practice are personnel management, organization and planning. The first actions to be taken by the company, in order to quickly and effectively achieve the set targets, therefore relate to the improvement of the efficiency of these instruments.

Personnel management

Two very different leadership styles can be identified: authoritarian and collaborative.

Both leadership styles are based on different perceptions of the manager's co-workers:

The authoritarian leadership style implies that employees want to avoid work and responsibility, that they therefore want and need to be directed and supervised. The only incentives to which the "average person" responds is to get money, security and status.

The ***collaborative leadership style*** implies that employees identify with their responsibilities in the company and are interested in them, just as much as in their sport and leisure activities. They do not regard work as tedious or punishment. They seek and find self-fulfilment and gratification in their work.

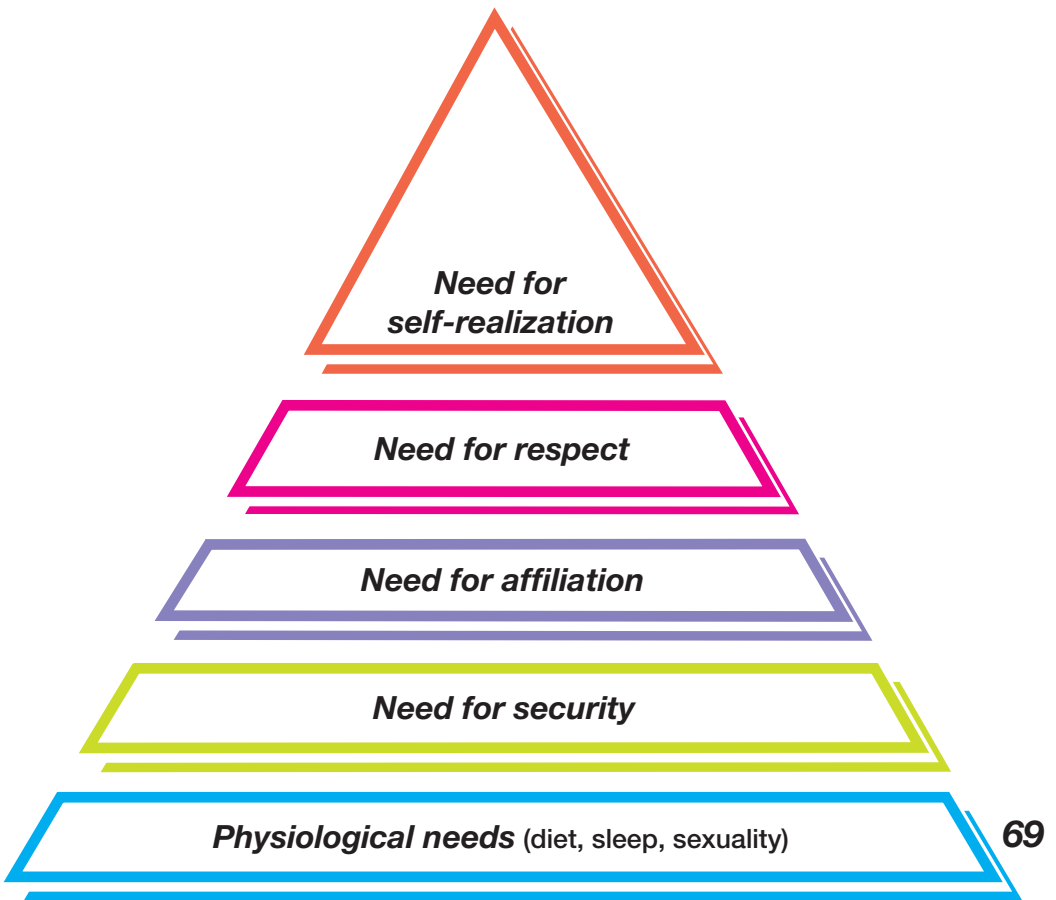
People's actions are the results of driving forces (motivation), triggered by an inner compulsion to satisfy specific needs. These needs can be prioritized according to their importance and frequency of occurrence.

For instance, if hunger as a physiological need is sated, this driving force is eliminated. It is replaced by the need for security. The individual then seeks to belong to a group in which he or she is respected and appreciated. The need for self-realization, the "Mount Olympus" of needs, is the final stage. It is the desire to do work, actually performing

the task is satisfaction enough, because of the creative opportunities.

■ The authoritarian leadership style is based on the assumption that the upper levels of the hierarchy of needs are meaningless to co-workers.

■ In contrast, the collaborative leadership style perceives a mature personality in the human being, with the desire to have its higher needs satisfied.



Hierarchy of human needs

The sense of belonging, which can also be offered by a supportive business (the loyal workforce clinging to a supportive boss), bases respect on status symbols (size of desk), rather than on performance. Such values will only attract employees who have no strong desire for responsibility or to show personal initiative. For such employees, the assumption of proponents of the authoritarian leadership style apply: they need and want a firm hand.

In the long run, companies with employees like these lack three crucial survival factors:

- The inner motivation of employees to excel
- The development of initiatives
- The unleashing of creative forces

In contrast, the collaborative leadership style seeks to develop human capabilities. Each management team should therefore first address the basics and try to establish a management style that suits the specific company.

Management guidelines

Collaborative leadership begins with the establishment of binding “rules” for working together in the company, in the form of management guidelines. Its main feature is the delegation of authority and responsibility. Each employee works independently in his or her own area of responsibility, and is responsible for making his or her own decisions.

This leadership principle is fundamentally different from the traditional conception, in which supervisors took full responsibility for the work produced, made all necessary decisions, and intervened at will in the work flow.

The management guidelines should include the following points (max. 10-15 pages):

- Mission statement
- Methods of formulating and defining goals

- Obligations and rights of the line manager
- Obligations and rights of the employee
- Responsibilities of the line manager and the employee
- Rules of deputation
- Significance of the individual management tools
- Working with teams, project groups and working parties
- Information systems
- Reporting systems
- Control systems

Many engineering companies have already implemented management guidelines. Models as examples facilitate the implementation procedure. They should not simply be copied, but rather adjusted or developed, in accordance with the company's specific requirements with the input of many senior employees.

The management guidelines must be an active and effective work tool, and not simply be filed away and ignored. They require the understanding and acceptance of managers and supervisors on all levels.

They will be ineffective if their implementation is not preceded by management training. Their content and purpose must be explained and their practical application demonstrated. Problems that have previously occurred should be discussed on the basis of the guidelines.

Advantages of the management guidelines include:

- Relief from routine tasks
- The ability to devote more time to corporate goals and strategies
- A better solution to the issue of promotion, as leadership skills are identified and nurtured at an early stage

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“Management by objectives”. On the one hand, modern leadership demands the full exploitation of the capabilities of the individual employee and, on the other, the coordination of individual performances to create a balanced whole.

Today, leadership no longer involves setting an example to the employee of good work (like the typical “master-apprentice” relationship in the workshop), but rather motivating employees so that certain goals are achieved.

Since modern managers generally do not have the same expertise as employees, the so-called leadership by command or instrument alone cannot ensure success.

Insufficient detailed knowledge at the management level places emphasis on the clear formulation of the target, as opposed to the job description. The line manager no longer explains what needs to be done, but set out what has to be achieved. Because of this, the employee is encouraged to act independently and on his/her own initiative.

“Management by objectives” is a multi-stage process. Secondary goals, which are binding for each employee, should be developed from the objectives set by the management. This process spans the entire corporate hierarchy, so that each manager has set out the objectives and secondary objectives for his or her staff.

However, this cannot be achieved without assessing the performance of the employees.

Target setting for employees consists of three stages:

Stage 1:

Before the beginning of the new business year, the employee prepares a set of goals that he or she wants to achieve in the coming year, and which he or she will be personally responsible for reaching.

Because the purpose of the goals is to achieve an improvement of the existing situation, it is essential that they are expressed as specifically as possible (only quantitative and deadlined goals are easily quantifiable and verifiable!).

The employee then discusses this list of targets with his or her supervisor. The goals are binding when both parties have their contents and accept them.

Creative new ideas arising during the target setting process must be passed upwards, and can be included in corporate planning. This requires sufficient flexibility in the use of this instrument and the casting of the respective secondary objectives in a plannable manner.

Stage 2:

Regular (e.g. quarterly) meetings between the line manager and the employee, to

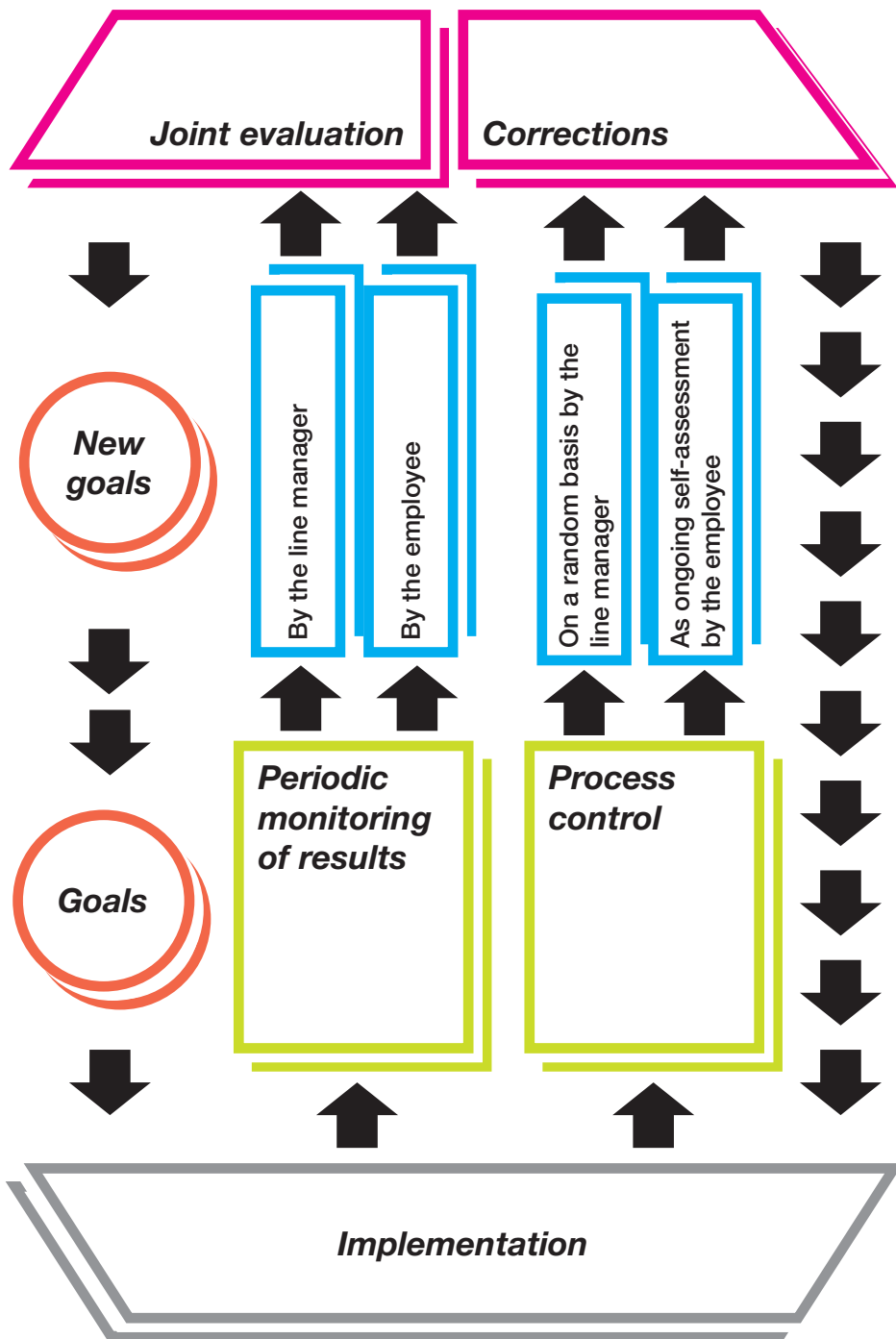
- discuss progress towards meeting the goals
- resolve any difficulties encountered, if appropriate with the line manager's support
- modify the goals, if necessary.

Stage 3:

A final report at the end of the business year documents whether the employee has achieved his or her goals, and if not, why not.

Management by objectives differs from the "traditional" method of management due to a shift in emphasis from the work flow to the results. In terms of process control, monitoring by the line manager should, as far as possible, be replaced with self-monitoring by the employee. Divergences from targets must be corrected by the employee, or reported to next higher level ("management by exception").

The results of regular performance monitoring serves to generate new performance goals and to improve work flows and organizational structure, and to determine measures for the training and development of employees.



“Management by objectives”- flow chart

“Management by objectives” is ineffective if

- the method is only handled mechanically, and not consciously applied (this is usually just additional paperwork!)
- the method only concerns goals, without taking into account that this must be achieved by using resources economically
- the targets are set too high, placing the employee under strain: although targets may be higher than the employee’s self-assessment of his or her capacity, there must be a realistic chance of the target being met if the employee uses all efforts (the so-called threshold effect).

Further training

Delegation of responsibility means that employees must be involved in corporate decision-making, in relation to co-determination on the basis of qualifications and performance. This requires the maintenance and continuous improvement of the performance of managers, through selective training.

The following principles apply to the in-service training of managers:

The personality traits of employees are the result of a lifelong maturation process. They can only be influenced to a limited extent by training (a controversial approach is so-called sensitivity training). However, a company can promote individual maturation in the long term (carefully planned secondments abroad, etc.), and create the environment required for the full personal development of managers.

Leadership skills can be taught. Daily application is the best training method. “Job rotation” (e.g. the systematic rotation of staff with central functions with employees with line management functions), entrusting employees with responsibility for special duties, and selective nurturing by the line manager (a “helping hand”, without intervening in the area of responsibility!), etc., accelerate the training process and provide practical experience. Workshop-based training supports practical training, by teaching certain leadership skills.

The most important procedures:

Incident method	➔	Procurement of specific information
Case studies	➔	Problem analysis
Corporate strategic planning simulation	➔	Decision training
Role plays	➔	Communication

Expert knowledge quickly becomes obsolete. It must be constantly renewed or extended, by means of training (internal and external), reading (specialist publications), attending information events, etc.

The development of an in-service training programme requires:

- The support of the company management - it must lead by example
- Readiness to allow the time and accept the costs
- Designation of officers responsible for in-service education and training, co-ordination and advice in the selection of methods, etc.

The training system must include: Career planning, taking into account the long-term needs for managers. It must also be comprehensive: isolated, incoherent measures are ineffective. Even a good training system will only pay off after a certain lead time. All the more reason to begin its implementation right now.

Organizational form

There is no recipe for the ideal organizational form. On the contrary, it must be determined by each individual company.

The first step is the analysis of the current state and the elimination of weaknesses on the basis of the following questions:

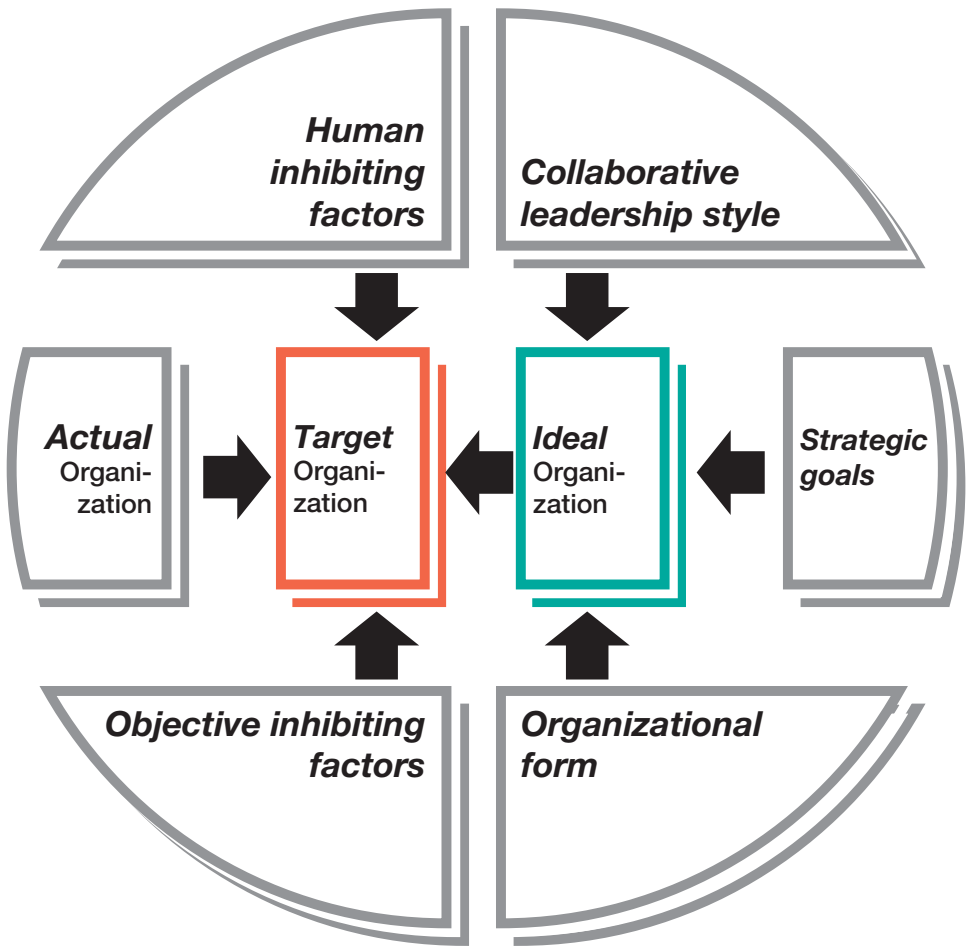
- Where do activities overlap?
- Which tasks should be merged?
- Which tasks should be assigned to other departments?
- How can areas of responsibility be better delimited?
- Which tasks can be transferred to administrative units?
- How can lines of communication be shortened?
- How can access to information be accelerated?
- How can overloading of individual employees with work be reduced and prevented in the future?
- Is sufficient attention being paid to the factors that determine the future success of the company?

The organizational structure must be focused on the goals and strategies of the company. A conscious decision should therefore be made to initially ignore the problems of the existing organizational structure and create an organizational model, with which the goals can be best achieved.

The target organization results from the comparison of the ideal state and actual state. It forms the basis for an optimum organization chart, under current personnel and material circumstances. Sensible compromises must be made between goal-orientated organization and the goals of the individual employee.

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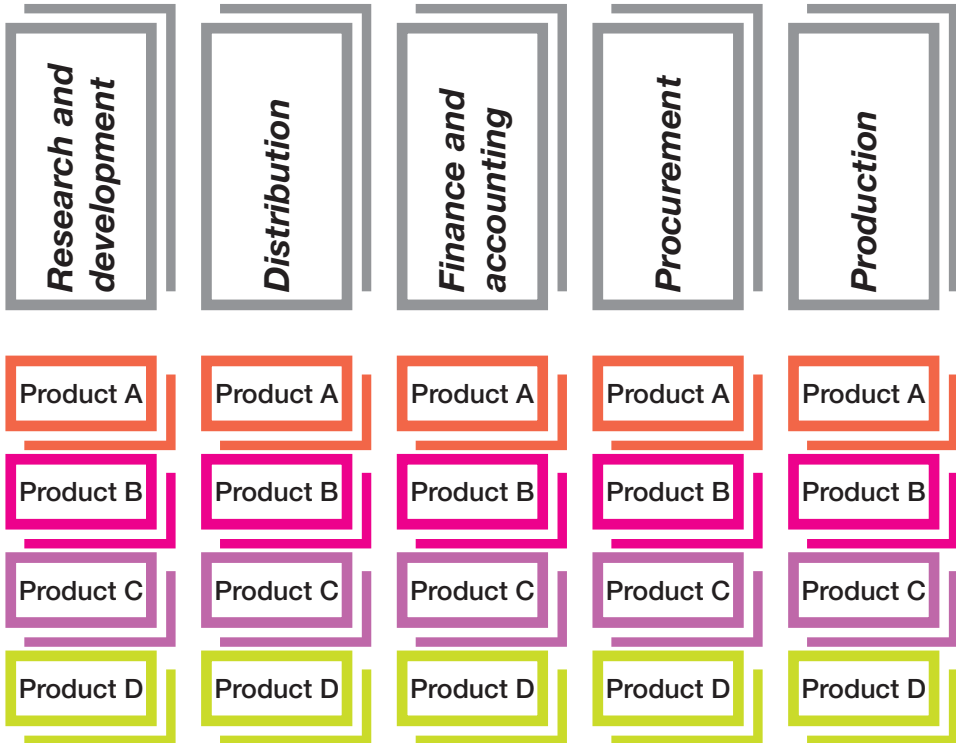
There is a choice between two basic types of organizational form: functional organization and divisional organization.



Development of the target organization

A feature of the presently most common form of organization, **functional organization**, is its division according to primary functions, such as procurement, research, development and design, production, sales, finance and accounting. The managers in charge of these departments either report directly to the management board or are themselves members of the board. The following graphic shows the structure of functional organizations (organization chart):

Business management



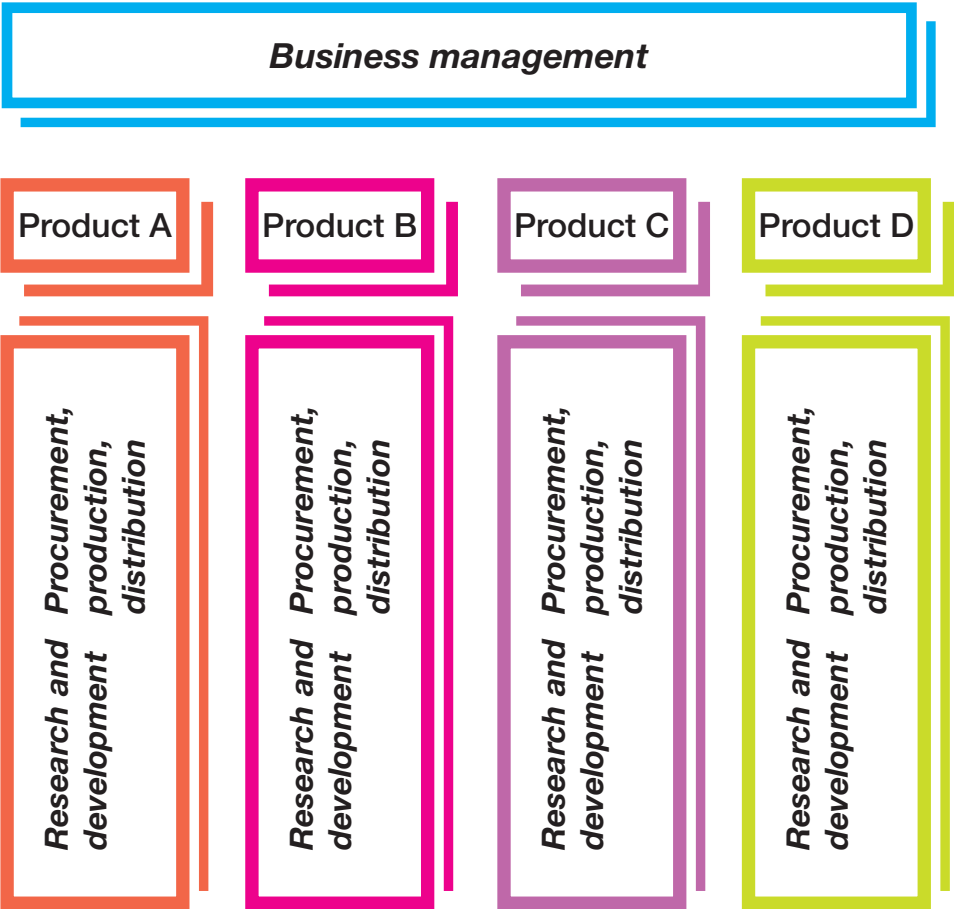
Structure of the functional organization

Advantages over the divisional organization:

- Lower administrative costs (executives are paid less highly than in the divisional structure)
- Higher level of specialization
- Less work overlap and duplication
- Consistent approach to standards, instructions and reporting
- Better coordination
- Market advantages (e.g. central purchasing)

On the other hand, the functional structure is also characterized by the frequently occurring separation of the business and technical areas and, accordingly, of commercial and technical management – which is in contradiction to all studies on modern management and which gives rise in many cases to almost irreconcilable tensions.

In contrast, the *divisional organization* is typified by a product-specific or product-range-related structure:



Structural diagram of the divisional organization

Advantages over the functional organization:

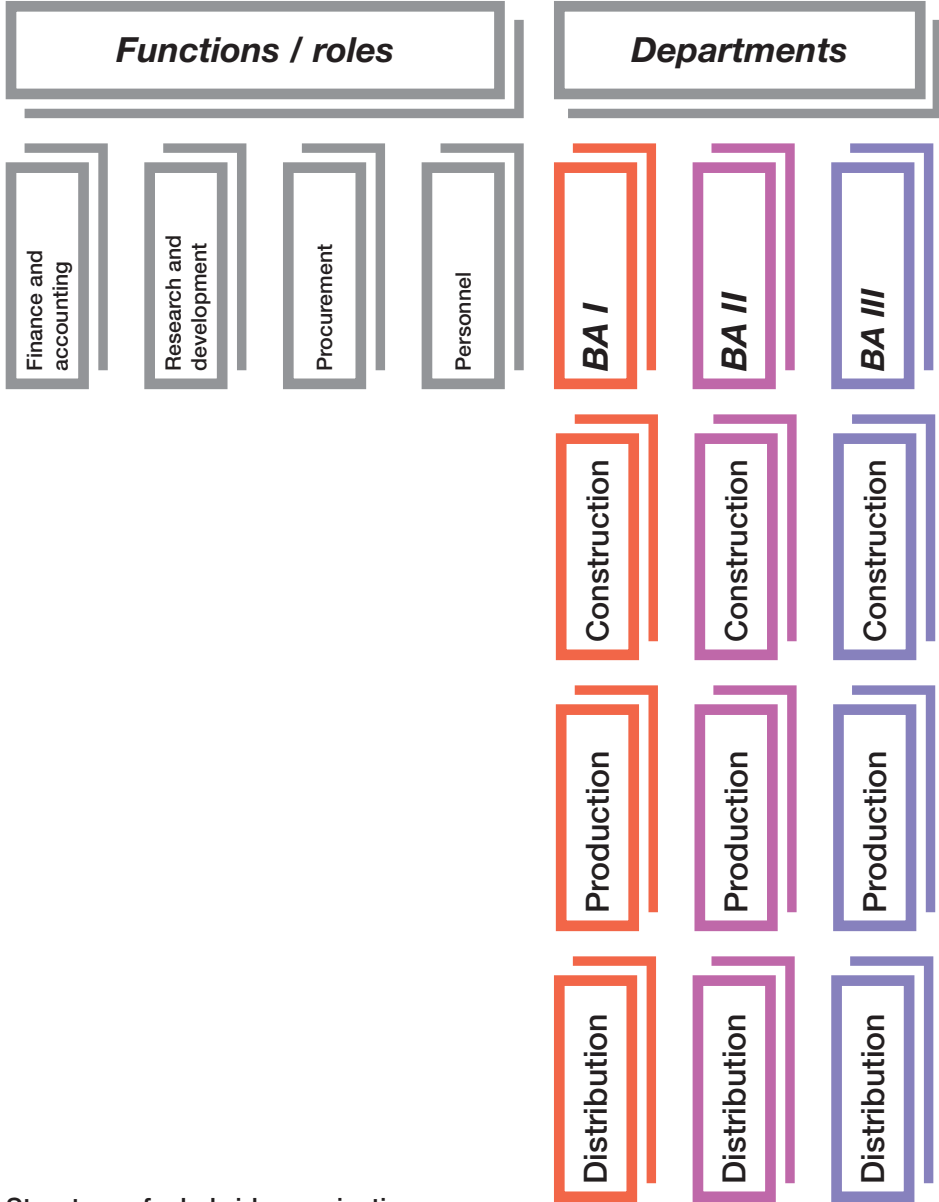
- Reduced workload for the management, as product-related coordination tasks are transferred to the divisional manager
- Clearer assignment of responsibilities
- Higher performance motivation
- More intensive preparation for management tasks
- Shorter lines of communication and faster access to information
- Greater flexibility in relation to market changes and unexpected events
- Smaller administrative system
- Better adaptation to customer-specific and local conditions, habits and customs

The dynamic of today's markets calls, in many cases, for product decentralization, i.e. a sector-based structure ("divisions"). On the other hand, the need to use the production system as efficiently as possible, to compensate for order fluctuations and varying capacity utilization, is better met by a functional organization.

In larger companies with very varied production ranges, it must be determined whether, and to what extent, specific products or product groups can be floated off to other organizational units. If this does not seem possible (e.g. if the turnover of an individual product group is too low to justify division), a *hybrid form* offers itself, in which the functions are decentralized in terms of products (except for those functions transcending divisional boundaries, such as purchasing, research and development, accounting, etc.).

The lack of coordination between the functions for a particular product range is eliminated by the use of divisional managers ("product managers") with corresponding duties and responsibilities. They "supervise" the product horizontally, i.e. across the functional boundaries, and coordinate all decisions relating to the product.

Business management



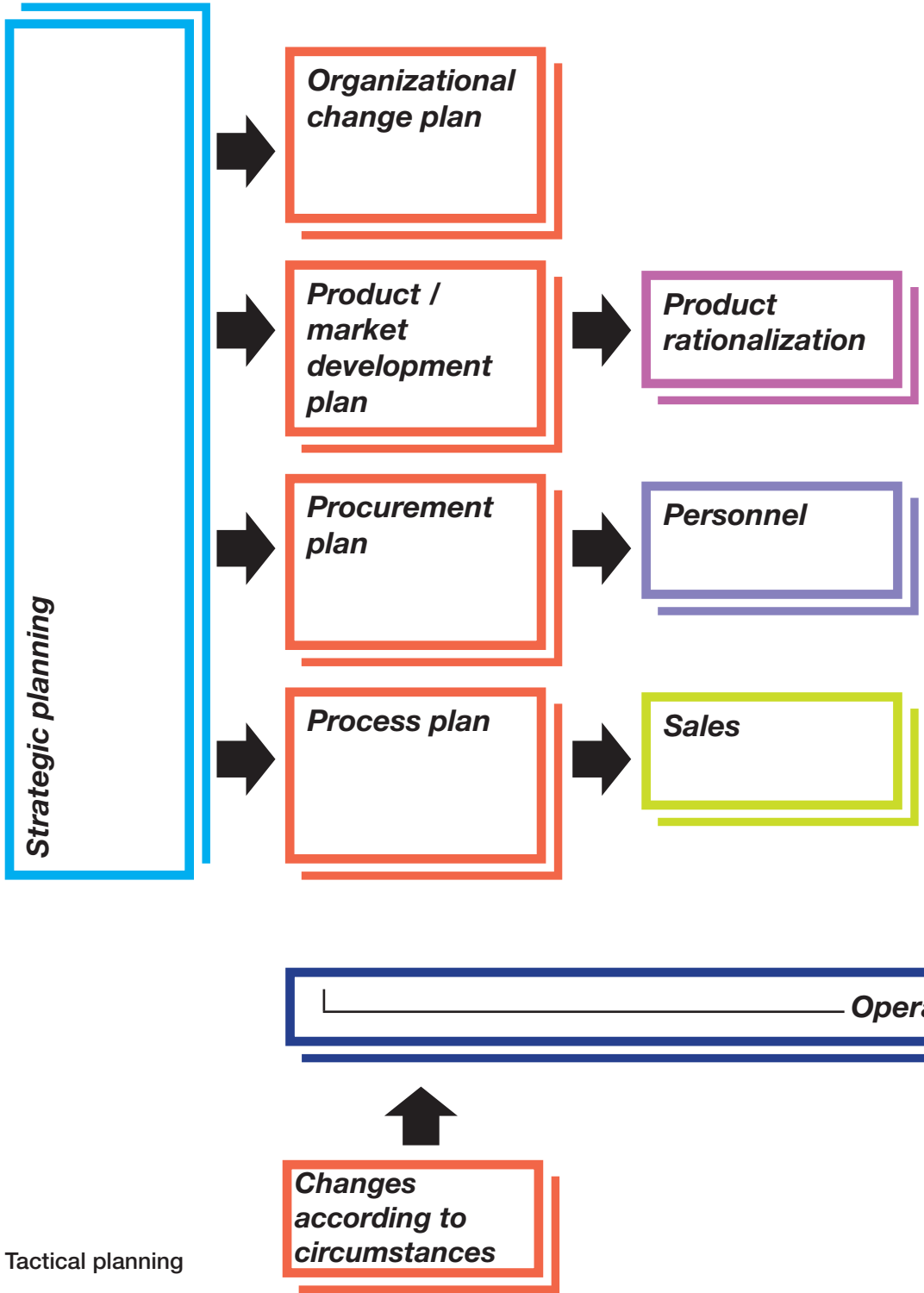
Structure of a hybrid organization
(BA = business areas)

Planning

Objectives, strategies and actions are the result of an ongoing business planning process that encompasses strategic planning, tactical planning and action planning (operational planning).

Differences between strategic planning and tactical planning

	Strategic planning	Tactical planning
Preparation	Management with administrative support	Head of departments, with coordination by administration or management
Content	Product range customers (markets)	Funding, sources and allocation of resources
Basis	Environmental analysis Business analysis Mission statement	Strategic planning
Form	Generally no fixed structure	Detailed structure
Purpose	Change Innovation	Practical realization
Number of alternatives	High	Limited
Uncertainty	High	Lower
Planning time	5 to 15 years	Up to 5 years
Information direction and content	Mainly outward, qualitative	Mainly inward, quantitative



Licences Collaborations Mergers

Research and development



Expansion

Diversification

Capital

Equipment

Material

Production

Purchasing

Strategic planning ————— *Budget* —————



Action

In strategic planning, strategies or goals required to reach objectives are developed (see Chapter 5). It is based on the company as a whole and has a long-term character (5 to 15 years).

Tactical planning follows on directly from strategic planning. The content: how – that is, by which means, actions and procedures – strategic goals can be achieved. It is a medium-term planning process (over 2 to 5 years), in which secondary and divisional objectives are harmonized with the company's goals and coordinated with each other.

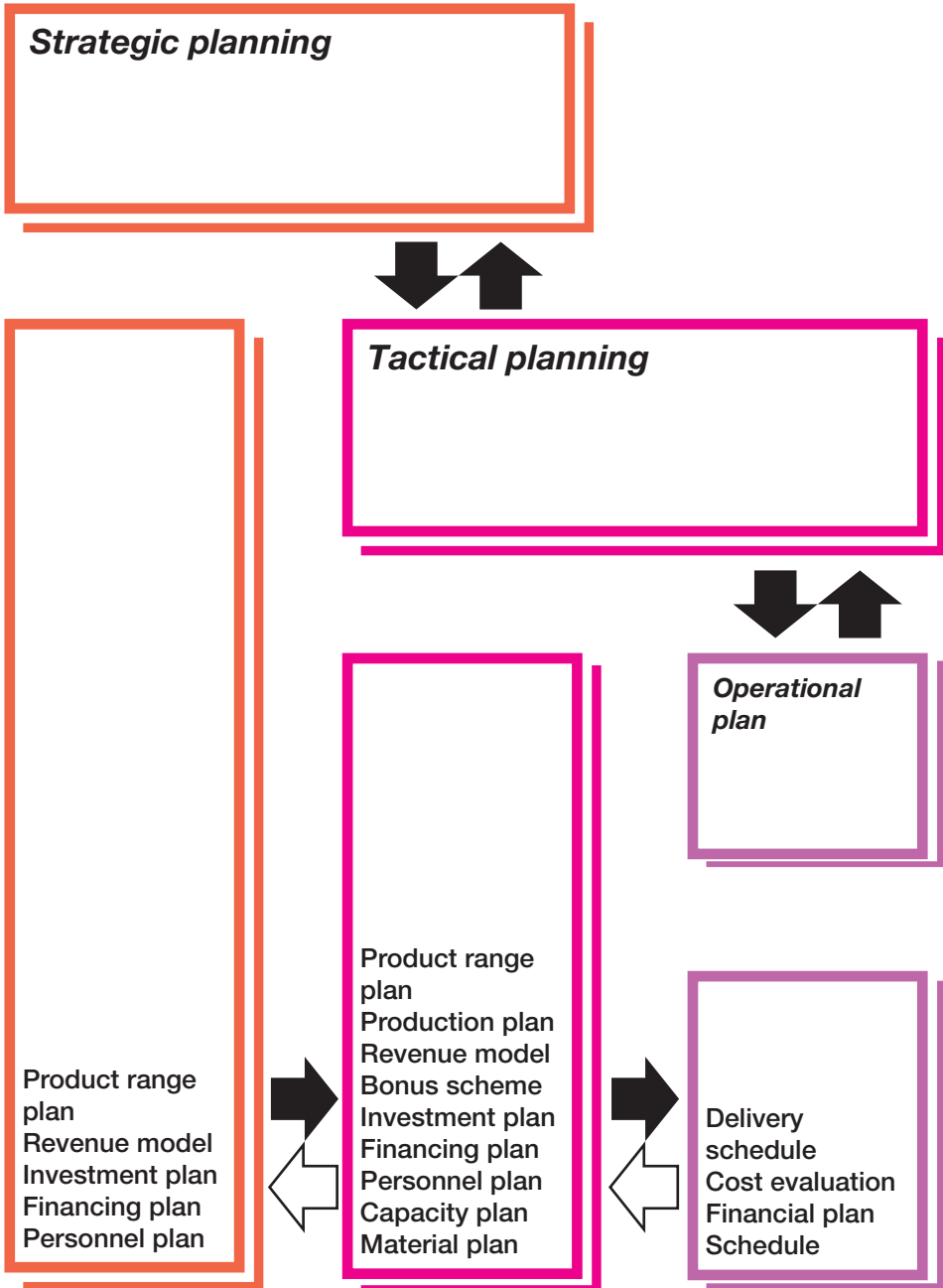
For example, tactical plans are created for organizational changes, product/market development and raising capital (see figure).

Operational planning (short-term, up to one year) defines detailed programmes, tasks and resources (budgets) for areas and departments.



The sequence and reconciliation of strategic, tactical and operational planning are entered in a time schedule.

The scheme is based on a self-contained planning system. In the planning stages described, the individual plans are revised and extended by one year respectively. Feedback and overlaps exist between all levels, so important changes in both directions (top down and bottom up) can be made.



Plans and planning phases

Closing comments

In many companies today, it is the top management that is blocking a move forward to the future. The six most common reasons:

Insistence on a one-sided divisional approach impairs management quality and "target setting"

Long-term planning is neglected because of overemphasis on the day's work

Too much traditional thinking inhibits commitment to the future

Not enough is done to encourage employee initiatives

Fear of losing control prevents the delegation of responsibility

Fear of conversion difficulties delays the introduction of modern management methods

The adaptation to rapidly changing environmental conditions requires a management system that resembles the one described here.

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If it has given you some suggestions and has been thought-provoking, then this chapter has served its purpose.

This study is based on relevant management literature produced in recent years, and the leadership knowledge of German engineering companies. Everyone who contributed support and advice during the writing of this work is hereby gratefully acknowledged.

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Problem catalogue

The range of engineering covers cogwheels, gears, engines, machines and turnkey systems of differing production depths. Small craft-work companies face competition from corporations with internationally trained executives and extensive staff departments. There are sectors of growth with a rapid expansion rate, as well as sectors in the stagnation or contraction phase. There are companies with an export rate of more than 80%, while others only trade on the domestic market. On the whole, the proportion of single-item or batch production lies between 0 and 100%. Partnerships and corporations, capital and labour-intensive enterprises exist side by side. A summary of the wide range of typical engineering problems of corporate management may be considered limited. Therefore, the following list is restricted to those issues that are encountered in the majority of engineering companies.

Company and employees

1 Management from the field of technology

2 Cost thinking, which is more prevalent than profit thinking (even cheaper prices are more oriented towards production costs than user value)

3 Constant integration of craft engineering companies into industrial manufacturing

4 Friction losses and conflicts of jurisdiction due to strict separation between commercial and technical management

- 5** Authoritarian leadership preventing workers' motivation to achieve
- 6** A high proportion of creative and flexible employees, which calls for new ways of leadership
- 7** Information flows are smooth and seamless
- 8.** Too much information from the business management, due to insufficient data selection
- 9** No clearly formulated and documented set of business goals
- 10** Missing or insufficient overall planning
- 11** No long-term production programme (lack of concepts)
- 12** Uncertainty regarding the succession and continuous management of family businesses
- 13** High susceptibility to possible interference by the State in asset-related issues (inheritance tax reform, etc.)
- 14** The capital turnover for similar companies, which can be strikingly different
- 15** Increasing capital requirements for research and development
- 16** Limited scope for growth due to difficulties in raising capital
- 17** Accumulation of capital and investment financing hindered by the income withdrawal of shareholders
- 18** Efforts to strengthen market position through operational alliances, which are rarely successful
- 19** Increasing business concentration through changes to the organizational structure and management system

20 Maintaining market leverage in the procurement sector and distribution sector, which is increasingly difficult for small and medium-sized enterprises

Market

21 High economic vulnerability and dependence on the investment behaviour of the user industry

22 Economic quantities at a high degree of specialization, which are only possible with the involvement of foreign markets

23 Market strategy (an increase in quality competition), mainly characterized by oligopolistic global competition (several major suppliers, plus many smaller ones)

24 Partial monopolistic practices in the procurement and sales sectors

25 Need to diversify, for the purpose of independence from particular customer and supplier groups

26 Increasing complexity of products, which requires adapting the organization of marketing (transition from dealer sales to direct sales)

27 Rising needs to explain the products and systems, which requires higher qualifications of sales staff (selection and training)

28 Fast response to customer requirements and market requirements, for continuous development and improvement of products (market advantage)

29 The high flexibility of production technology, which complicates accurate investment planning and capacity requirement planning

30 Programme and profit planning, which are too strongly influenced by economic fluctuations (long-term orientation is missing)

31 Conflict of goals between the specialization of production facilities and the flexibility of production technology

32 Increasing commercial risks due to accelerating technological advances (new processes, materials, products, structural changes)

33 Fixed prices for products with long processing times, which endanger the company's revenue (increases in material prices and labour costs are hardly detectable, and escalation clauses are only partially used or recognized)

34 Regulated remuneration of "software" (planning, consulting, training, etc.), which is inconsistent or difficult to enforce

35 Export orientation as a prerequisite for continuous employment (compensation for fluctuations in domestic economy, commercial production runs), which leads to additional costs for the development and expansion of the service network, deployment of workers, foreign market research and competitive analysis, as well as the company's own sales affiliates

36 Export market, which must be nurtured, even under difficult conditions such as appreciation of currency, long payment terms, and long delivery times (reserving contingents during economic upswings)

37 Adaptation to the conditions of international competition, which demands changes to the size of both the company and the batches produced

38 Increasing exports and foreign investments, which lead to increased demand for internationally trained executives (multinational corporate management and use of specialists with more detailed local knowledge)

39 A rising export ratio, which increases business risks (parity fluctuations, political risks, long-term financing)

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40 High expenses for the adaptation of products to the technical requirements of foreign countries (test specifications, standards, etc.)

41 Continuous demand, particularly for large systems, which is not always guaranteed, e.g. due to temporary market saturation

42 Costly export procedures (cooperation with carriers, export credit insurers, banks and foreign authorities)

Product

43 Increasing the proportion of special machines and “solutions to problems” manufactured as a single unit

44 Increasing input as part of the tender (project planning)

45 Small batches and long production lead times

46 Labour-intensive production

47 Increasing demand for skilled workers when supply of the latter is decreasing

48 Unilateral dependence on specific basic materials (primarily steel and cast iron) and supplies (electric motors, bearings, gears, etc.)

49 Conflict of objectives between in-house manufacturing and the “extended workbench” (opting for economic efficiency or flexibility)

50 Limited rationalization opportunities in the manufacturing sector, due to the high proportion of single and small batch production with complex machinery

51 Delays in the rationalization of the development, design and work preparation, due to high capital requirements

52 Adjustment of capacity for research, development and design, project planning and production, which is difficult because of varying demand

53 Product value analysis and the use of application technology as routine tasks, to overcome “product and process blindness”

54 Transportation and storage (long processing times, extreme dimensions and weights), which require precise process organization and scheduling

55 High capital in current assets and large stocks of semi-finished products

56 Statutory safety regulations (e.g. environmental protection), which create significant additional costs for services and products (restrictions to the design and manufacturing margins)

57 Delivery deadlines, production planning and schedule planning, which are key determinants of the performance of a supplier

50 Shifting production to countries with lower costs, due to increasing wage pressures

59 Rapid technological progress, which requires expensive worldwide product monitoring and documentation of new developments and substitute products

60 Systematic training of employees in the manufacturing sector as a prerequisite for the maintenance of performance standards

61 Fluctuation of skilled workers in the production area (sought after in other industries because of their specialized training)

62 Labour demand, which increases in line with sales (opposite trend in other industries)

63 Increasing shortage of academic and technical engineers (a long-term structural problem)

