Goals, Production Factors and Results

5

Having lost sight of our goals,
we redoubled our efforts.
Mark Twain (1835–1910)

Opening Vignette

Russell Laurence and Daniel James were members of a small group of activists; the group was called PtP—Protect the Planet. They were both part of the leadership team of the group and had met up in a café to prepare for the next meeting. The group had had some success in the past with media-friendly actions; Russell had climbed to the top of a local landmark and had hung out a banner saying, "Meat is murder!", while Daniel was well-known locally for leading protests against a large manufacturing company that was refusing to clean up some land it had polluted 25 years previously.

The problem was that the group was losing members. One of them had said, "I don't know what we stand for any more! On the one hand we're protesting against factory farming, and on the other hand we're going on about pollution—and that's what we're really about!" Losing members meant losing income, and money was always a problem in any case.

So as the two activists sat down to drink their fair-trade coffee, they were both aware that PtP was facing a crisis. Daniel started off. "I think we need to be clear about what we're trying to do. What are our objectives as a group? What are our goals?" Russell took a sip from his coffee and said, "I agree we've gone in too many different directions. Let's take a moment to think about what we're trying to achieve." Three coffees later they had decided they needed to relaunch the group and had come up with a mission statement. "Having a mission statement sounds a bit corporate to me," Daniel had said, but came to realise that having a short, clear declaration of what PtP was "all about" would be helpful. As Russell had argued, "It

P. Eichhorn, I. Towers, *Principles of Management*, Springer Texts in Business and Economics, https://doi.org/10.1007/978-3-319-70902-4_5

will give us a direction and keep us focussed. And then we won't be pulled into doing a lot of things that aren't connected to each other."

The meeting of the group members took place three days after the coffee shop discussion. Russell and Daniel presented the mission statement, and following a lengthy discussion which involved the consumption of large amounts of organic alcoholic and non-alcoholic drinks, the group had come up with a plan that was based on the mission statement. Lily, one of the older members, commented, "Excellent! Now we've finally been able to set goals and prioritise them. Good work guys!" and Frank, another of the older members, added with a look of determination on his face, "I agree, and this will also make it a bit easier to get new members."

As he cycled home after the meeting, Daniel thought more about the mission statement and became even more convinced that it would mark a turning point in the history of the group: "PtP works to conserve and restore the systems on which all life on the planet Earth depends."

5.1 Goal Setting

5.1.1 Types of Goals

Goals represent a desired situation; individuals and institutions set them to guide their behaviour. Broadly speaking, the members of households in the west—once their basic physiological and psychological needs have been met—strive for personal development and self-actualisation (cf. Maslow's hierarchy of needs discussed in Chap. 2); firms seek profit or at least to break even; associations wish to satisfy the needs of their members; administrations want to meet general public needs. The first two groups' goals are the **coverage of individual needs**, whereas the two other are seeking **to cover the needs of others**. These different types of goals are not in conflict but rather complement and complete each other.

The realisation of one goal often leads to meeting others, so we can distinguish between **original goals** and **derived goals**. Meeting goals often does not only benefit the person or institution who sets the goal. If a member of a household takes part in a yoga class for reasons of personal development (original goal), they are also helping the yoga teacher to meet her goals (derived goals), and if the teacher is renting studio space, she is helping the property owners to meet their (derived) goals, and so on, almost *ad infinitum*. Similarly, associations and administrations must meet their own goals of having adequate resources for them be able to provide services to others.

There are **successive goals**. There can also be **simultaneous goals**, as in the case of charitable institutions and the majority of state and municipal enterprises—profit (or covering their costs) does not take precedence over meeting the needs of their users. Both sets of goals are to be met simultaneously, so we can refer to dual goal setting, but this does not necessarily imply that the goals are of equal importance. The goals may supplement and complement one another, so the achievement of one goal

will lead to the achievement of the other—**complementary or compatible goals**. The opposite is also possible: two goals can stand in conflict with each other, when pursuing one will negatively affect the achievement of the other—**competing or incompatible goals**. Furthermore, simultaneous goals are not necessarily interdependent, so the pursuit and achievement of one has no impact on the other—**neutral or indifferent goals**.

The goals of economic agents can be classified by their source. Contrary to generally accepted opinion, it is not always the case that goals are **self-determined**. If we look at public companies, for example, the board of directors can and does set corporate goals, but major shareholders can and do exercise significant influence over goal setting. A shareholder could of course sit on the board of directors, in which case they are not a third party, but sitting on the board is not a prerequisite for exercising influence on firms' goals; banks can be very influential in goal setting, as many companies and individuals who owe them money can attest. Administrations are subject to **goal setting by others** as the goals of government departments and agencies are set by legislation and regulation, from specifying to whom services are to be provided to identifying the objectives to be met during the procurement process (such as favouring suppliers from the region).

Further classifications of goals can be based on organisational characteristics: the goals of departments, divisions, profit centres, branch etc., individual job positions and the employees themselves. The goals of individual employees can be determined by their managers and/or by themselves and therefore have to be aligned with **institutional and individual goals**, between which there can be a greater or lesser degree of conflict. A simple example of this is when a father needs to leave early to pick up his child from kindergarten but whose boss has told him that a report needs to be finished. There can also be conflict between the goals of two different departments in the same company—sales departments want to get new software products on the market as soon as possible while programmers want to get all the problems sorted out first.

We can also differentiate between **global and specific goals**. Particularly in the field of public services, goals tend to be quite general, so specific concrete goals must be determined by individual entities. Overall objectives are generally based on legislation and regulation: energy supply enterprises are obligated to provide a country-wide, safe, cost-effective and environmentally friendly supply; businesses responsible for local public transportation must comply with given regulatory obligations (e.g. routes and frequency of bus services); savings banks must encourage saving and provide credit to the less well-off. Associations are also not completely free to set their own goals, as is the case of charitable organisations, which are not permitted to have purely economic goals. Global goals may be set by a holding company, in which case the companies owned by the holding must determine their own specific goals, strategies and structures.

Managers are generally most interested in their organisation's individual economic goals, which can be categorised on the basis of the **production factor** involved:

- **Labour**: there are personal and socio-political goals for areas such as recruitment, education, training, apprenticeships, corporate identity, job security, job creation, work climate improvement, remuneration policies, profit sharing policies etc.
- Among the relevant goals arising from the use of **capital** are those related to profit and profitability, liquidity, capital maintenance, equity appreciation, capital risk protection, creditworthiness and solvency.
- The use of **material** (e.g. operating resources and raw materials) leads to goal setting in areas like technical advancement, capacity growth, material quality and maintenance.
- Goals exist also for **other** input factors such as **energy** (e.g. energy-saving), **services** (e.g. safety, punctuality), **law** (e.g. patent protection) as well as the **natural environment** (e.g. decreasing emissions).

Discussions of the future often revolve around the concept of sustainable development at both the global and local level, and this involves the balancing of **economic, ecological and social goals**. Economic goals are related to the factors of production already discussed, while ecological and social goals relate to the environment and people. The **triple bottom line** is a concept managers can use as they decide on ways to meet economic goals in ways that do not harm the planet or human beings. A concept that has emerged from corporate social responsibility, the triple bottom line asks managers questions such as: are you willing to make 0.05€ less profit per shirt so that the women in Bangladesh who made them earn enough to live on? Is your company willing to increase its manufacturing costs by 1% so that waste is disposed of in an ecologically sound way? In the long term, the needs of the economy for profitable, innovative and competitive companies can only be met if business entities do not neglect their responsibilities for the social and natural environment.

Operational functions can also be criteria for categorising goals, leading to the identification of **procurement**, **production and distribution** goals. A further breakdown of goals in manufacturing companies can include those related to warehousing and storage, transportation, production and waste disposal; hospitals' goals include in/out-patient care, diagnosis and treatment, home care and hospital stays; city administrations' goals can be in the areas of city planning, licensing, budgeting and so on.

In the area of goal setting itself we find: **management and execution goals** (explained in detail in Sect. 9.1.2), **strategic and operative goals** as well as goals related to **planning, execution and supervision**. Management and execution goals are generally set for institutions (e.g. companies) or individuals (e.g. managers); strategic goals are fundamental in nature and oriented to the long-term, while operational goals are short-term in nature and are concrete and specific. Planning, execution and supervision goals rely on various management tools and relate to different phases of the management process.

The different types of goal are shown in Fig. 5.1.

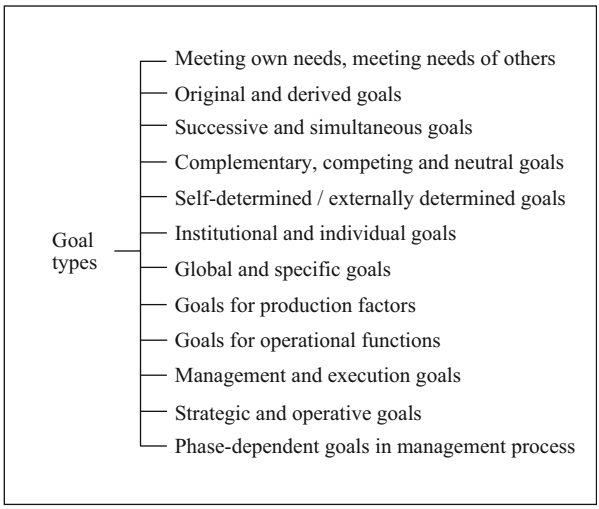

Fig. 5.1 Types of goal

5.1.2 Goal Systems

In the search for a taxonomy of goals, a categorisation of **formal and substantive goals** is helpful because it locates them within an economic system. A **formal goal** is a desired state expressed in financial terms; typical examples are income, profit, profitability, cash flow and profit contribution. **Substantive goals** represent the desired state of an activity, and can be expressed in terms of quantity, quality, space and time. Given the unlimited number of human needs and the limited amount of resources, there are an unlimited number of substantive goals, because they are based on meeting all kinds of needs—physical, psychological, sports-related, political, cultural and so on.

Through a connection with formal goals, substantive goals can also be expressed in economic terms; if this does not happen, the financial and business aspects of substantive goals are lost. Formal goals determine economic activity, which in itself does not depend on substantive goals, and this fact may lead to their fetishisation. However, if people and organisations only follow formal goals without taking substantive goals into account, they may be criticised because such an approach can (and often does) lead to social injustice, harm to people's health and ecological destruction. **Business ethics** involves questioning the meaning and value of economic activity and warning us against blindly equating economic activity with rational behaviour. Business ethics provide a bridge between formal and substantive goals by highlighting their mutual dependence.

Ideally, economic entities should pursue both types of goal, but realistically one of the two types will be prioritised—formal goals dominate in firms and substantive goals in public administrations and often in municipally-owned and state-owned enterprises. The formal goals of the profit-driven enterprise revolve around **profitability**, **liquidity** and **security**. There can be an optimum relationship between

these goals in a **magic triangle**, "magic" because achievement of all three goals requires a bit of wizardry. It is in fact extremely difficult, if not impossible, to maximise them individually as they stand in competition to one other. For instance: if managers concentrate on achieving the highest possible profitability, liquidity may be under threat, as may be the security of financial and non-financial assets. Excessive liquidity reserves have a negative effect on profitability and limit the growth of a business. Finally, exaggerated protective measures or total risk-avoidance can negatively impact company capital gains, profit and liquidity.

A company's strategy will determine whether it prioritises one of these three goals or treats them all equally. If one **main goal** is selected, the other two goals will act as **constraints**, although they too must be met. Profitability generally has top priority in businesses; the target—what is measured—is profit (short- or long-term, retained or distributed). Even in cases where managers have been accused of setting an increase of their personal income as the main goal, as has sometimes been argued in recent years, profit remains the core theme, around which everything else revolves.

The substantive goals of profit-driven companies can be divided into three categories: economic, social and ecological. **Substantive economic goals** include customer orientation, performance and competitiveness. *Customer orientation* implies that company strategies, structures, operations and processes are aligned to the needs of the customer, i.e. the goods and services provided (the output) are not determined purely by the input for customer retention and winning new customers are the top priorities. Associated with these primary goals are many secondary goals such as focus on target markets, customer care, support services etc. *Performance* is an overall goal related to the production of goods and services, and it can be broken down into secondary goals for productivity, capacity utilisation, employee qualification, inventory turnover, delivery times and so on. *Competitiveness* emphasises meeting secondary goals for things such as price-performance ratio, product quality, market share and growth, brand preference etc.

Good corporate behaviour, social responsibility and employee satisfaction are examples of **substantive social goals**. These goals also have secondary goals. *Good corporate behaviour* includes not breaking the law, upholding the rules for good business practices and control (i.e. corporate governance) and placing limits on the exercise of power (e.g. when faced with weaker contracting parties). *Social responsibility* includes the integration of "various cultures, religions, nationalities, races, ethnic and social groups, gender identities and individuals of all ages" (as stated in Siemens' guidelines; see Sect. 9.1.5), communication with stakeholders and taking into account their interests as well as public acceptance. The goal of *employee satisfaction* includes corporate health management (physical and mental), motivation, and fair treatment in terms of pay and conditions.

The protection of nature and the environment is the central priority of **substantive ecologic goals** such as resource conservation, avoidance of hazardous substances and safe disposal of waste. Verifying the extent to which this kind of goal has been met depends of course—as is the case with all goals—on its operationalisation. *Resource conservation* means pursuing sub-goals such as the

frugal use of materials, use of environmentally-friendly substances, avoidance of excess waste, reducing overall weight of products, increasing the lifetime of products and optimal logistics. The use of recycled materials and the development of recycling processes through which the waste of one stage of production becomes the input for another product are also relevant goals, being inherent in the **circular economy**. Further relevant sub-goals related to ecology include the reduction of emissions and immissions during production, transport and storage, during recycling processes for waste materials, during the collection, handling, treatment and disposal of waste. To this list can be added the environmentally-friendly disposal of waste, and the evaluation and monitoring of work sites, vehicles, materials and production with regard to their effect on the natural environment. The great difficulty remains that the goal is to avoid harmful outcomes and impacts on the natural environment but the reality is that damage can only be reduced, not eliminated.

The goals mentioned here are (or should be) the operational goals of an economic agent, but they can also be environmental policy goals at the national and international level. This is also true for refuse and waste disposal issues and the management of environmental damage. Sub-goals include estimates for the degree of liability, cost-related risks and financing issues, contracting experts for incident prevention with available technologies (e.g. automatic alert system in the event of an accident), repair of accidental or continuous pollution, as well as identification of contaminated areas and their decontamination.

Substantive goals are interdependent—the goal of an increase in performance levels and competitiveness must take into consideration the effect on the workforce and occupational safety as well as on emissions and immissions, for example. The optimisation of goals requires that all substantive goals and formal goals are harmonised through the consideration of priorities and of the relations between complementary, competitive and neutral goals—once this is done, a well-defined overall goal emerges. It should be noted that these issues apply to all kinds of economic entity, not just to firms.

To demonstrate this, we can look at the **goal system of public administrations**, where meeting needs and the fulfilment of substantive goals take priority, while formal goals have more of a secondary role. Of all the substantive goals, **substantive social goals** are the most important, above all the legality of the administrations' activities. In order to carry out public tasks legally, administrations must respect the basic principles of equal treatment of citizens, objectivity and the appropriate use of resources. The principle of the welfare state and duty-of-care as an employer ensure that the conduct of public administrations is acceptable to society and employee-friendly. All public administrations, not only environmental authorities, have a constitutional duty to uphold the national goal to protect the environment and natural resources.

In addition to **substantive ecological goals**, public administrations also pursue **substantive economic goals**. *Customer orientation* requires that the services provided meet the needs of members of the public and companies asking for them, which could then involve making changes in the organisational structure of

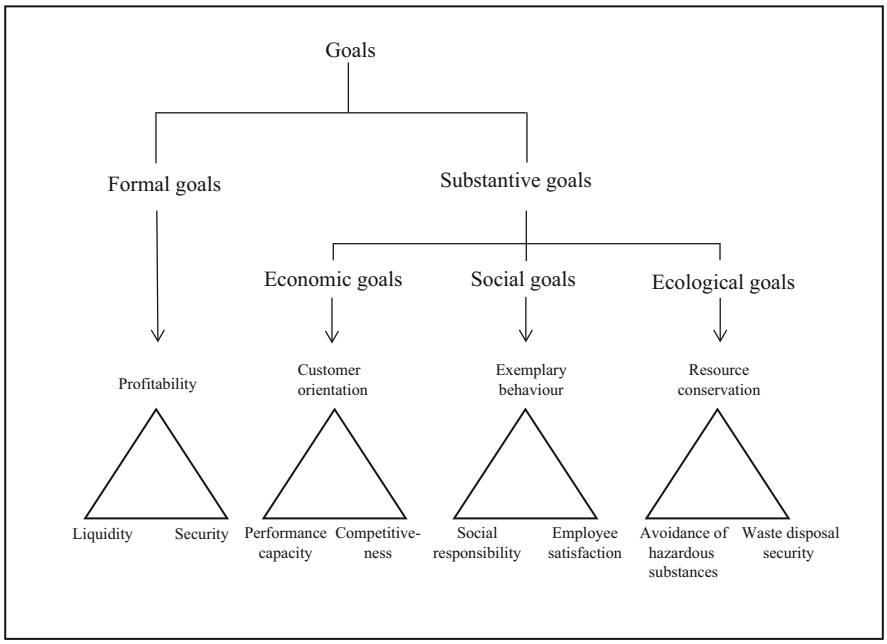

Fig. 5.2 The goal system of economic entities

the authority. Behind the overall goal of *performance level* there are multiple specific goals such as: meeting requirements related to personal freedoms, foreign and domestic security, protection from nuclear accidents, infrastructure improvements, supply guarantee, transportation; planning projects (e.g. land-use, national, regional and urban planning); health and social services; culture and sport, user-friendly services (information, advice, assistance and access); productivity; capacity utilisation and capacity building. *Competitiveness* could also be considered as a goal since, contrary to what many people believe, public administrations compete with each other to attract industries, entrepreneurs, educational institutions, associations, boards, courts, tourists, visitors, students, ideas, public funds, personnel, offices etc. This competition is not just national; European cities are competing to become the new homes of institutions that must move out of London due to Brexit, for instance.

Figure 5.2 provides an overview of the goal system of economic entities. The substantive goals depend on the economic agent and here we are using a manufacturing company as an example; a hospital would have different substantive goals, which would include medical goals, and a state university would have educational goals and different formal goals. For simplicity goals are illustrated using triangles.

5.1.3 Goal Concepts

Economic entities pursue a multitude of goals and because the majority of goals are in some way connected, the type, priority, scope, quality and time-frame of the goals must be determined. The result is the goal concept, which may be implied or explicitly formulated. Even when the goal concept is developed formally, there are often unknown and perhaps even unknowable goals outside the concept which may be crucial. As former US Defense Secretary Donald Rumsfeld (born 1932) said in 2002, "There are things we know that we know. There are known unknowns. That is to say there are things that we now know we don't know. But there are also unknown unknowns. There are things we do not know we don't know."

Given the importance of operationalising goals, and based on the differentiation between of formal and substantive goals, we can identify two interdependent concepts: finance-related and output-related. As Fig. 5.3 shows, the target orientation of **firms** is to maximise the profit from a given revenue, the target orientation of **non-profit organisations** is to maximise output while breaking even, and of **organisations dependent on public subsidies** to minimise costs or losses for a given output.

The **finance concept** of a company specifies the amount of profit, the period it should be earned in, its relationship to capital expenditure and sales revenue, and how this profit will be achieved (based on division, profit centre, product, customer group, sales region etc.). It also determines how the profit will later be used. Similar figures are also needed for other types of economic entities. Instead of thinking about profitability, individual households are concerned with the division of income across their various needs, associations want to know how their income from memberships is made up, and the concerns for administrations include tax revenue per head, per location and per period, as well as tax burdens.

The implementation of the financial concept takes place through payments, the subject of **liquidity planning**. The optimisation of cash flows means that the remaining solvent is achieved through the efficient use of financial resources, i.e. having enough money (in cash, in the bank or available through other means) at the right time and at the lowest cost. In addition to cash flow variables (size and

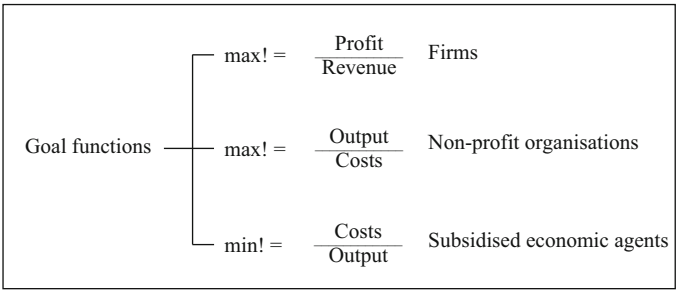

Fig. 5.3 Overview of goal functions

timing), financial concepts include the size (as shown in a balance sheet) of items such as cash holdings, bank deposits, accounts receivable and financial investments (**financial assets**) on the one hand and equity, liability reserves and liabilities (**capital rights**) on the other. The amount and composition of capital needed and its financing is dependent upon the output concept (see below) and the leverage effect. The more debt capital a firm uses to finance its activities, the higher its return on equity—as long as the return on debt equity is lower than the overall return on equity, i.e. when debt capital is cheaper. At the same time though, the higher the leverage, the greater the risk of the loss of the firm's own equity.

The **output concept** (sometimes **performance concept or programme**) of a firm is more than the business purpose as outlined in the articles of incorporation of limited companies, charters of joint-stock corporations and registered co-operatives, or in legislation and decrees for municipal enterprises. Such documents include simple statements like: "The purpose of the company is production of vehicles", or "The company's purpose is to produce and distribute electricity." Included in an output concept are the types of product or service, their extent, quality, features, places, timings and prices.

The output concept is closely linked via costs, prices and revenues to the financial concept. In addition to taking into account technical issues, decisions must be made on the economic and ecological facets of operations related to location, processes, warehousing, transport and waste management etc. The value of the **tangible assets** used in output processes provides a link to the financial concept. The interdependent nature of the output and financial concepts means that both are concerned with the necessary fixed and current assets and their financing.

Figure 5.4 summarises the components of goal concepts.

5.1.4 Mission Statements

Goal concepts—no matter how sophisticated—are not enough. The leaders and as many employees as possible of an organisation need to be convinced by them. The usual next step is therefore to develop a mission statement that has an effect on those both inside and outside the organisation. It captures what the organisation is ultimately "all about" in the form of **guiding principles and axioms** that relate the overall abstract objective of the organisation to more concrete ways of acting. Many business entities have mission statements:

- Oxfam: A just world without poverty
- Bristol-Myers Squibb: To discover, develop and deliver innovative medicines that help patients prevail over serious diseases
- BBC: To enrich people's lives with programmes and services that inform, educate and entertain.

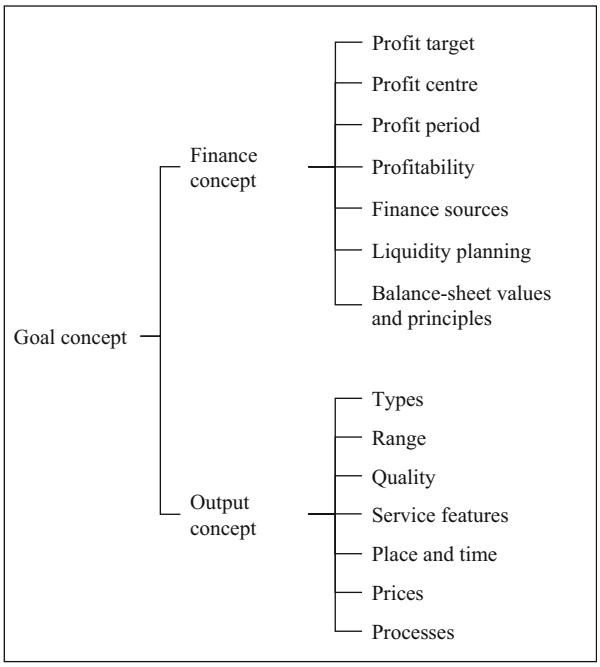

Fig. 5.4 Components of a goal concept

Other economic entities maintain other principles: households, for example, may follow a religious way of living, associations might hold common interests, social insurances are "about" the pooling of risks in solidarity, and administrations are "about" the identification of collective needs and their fulfilment. Recently, even universities have developed sets of guiding principles in order to raise their profile in the face of competition. A good example is Cornell University's mission: "to discover, preserve, and disseminate knowledge; produce creative work; and promote a culture of broad inquiry throughout and beyond the Cornell community."

One component of guiding principles is the **management philosophy**. This is based on the basic values and norms that are intended be the at the heart of how the organisation and its staff are managed. Attitudes towards profit, substantive goals, business partners, customers, apprentices, social contributions, profit and asset sharing among employees, employee participation, environmental protection, charitable donations and sponsorships etc. must be clarified and developed.

Closely related is **organisational culture**, which helps to develop the ways of thinking and behaving of the organisation's leaders and employees, and moves them towards those implicit in the management philosophy, which itself is of course influenced by the organisational culture. From the perspective of the organisation is it desirable that the goals that are set correspond to those of all who are involved. This is crucial for avoiding internal conflicts in interpersonal

relationships and it plays a major role in ensuring that the members of the organisation behave in a consistent way when dealing with those outside it.

Management philosophy and organisational culture should contribute to the establishment of a public identity for the organisation. A clear **corporate identity** (CI) makes it possible to create a relationship between product and producer, and thus helps the company to develop a consistent appearance or **image**. An organisation must use the tools of CI-making to try to ensure that its self-image and its public image are the same. Elements that are instrumental for the formation of the image include product quality, reliability, customer-orientation, customer service as well as social and ecological responsibility. Standards for customer relations should match standards for managing the people in the company.

The image of the company to its own employees is highly influenced by their sense of self-esteem and the extent to which there is a feeling of "we" rather than "they" when employees think about their company. Individual employees must be able to identify themselves as important players in the team. Expert knowledge, flexibility and credibility play key roles in relationships both inside and outside. Those who are meant to see and be influenced by the image include the owners, members, sponsors, neighbours, media and the public—in essence, all actual or potential stakeholders, who each have a different relationship to the organisation. The marketing function is normally responsible for the development and management of corporate identity, using methods such as public relations, sponsorships, promotion and even corporate social responsibility to create the right image. A positive corporate image is also important for human resource activities, particularly recruitment.

The development of a mission statement or set of guiding principles raises many questions, the answers to which necessarily differ, depending as they do on factors including the type of economic agent, its branch, size, legal status, ownership, goal concept and situation:

- Which values that have an influence on attitude and behaviour do the leaders hold?
- What kind of behaviour and which attitudes and approaches are accepted by the majority of employees?
- Who is aware of the economic entity and how do they form their opinion about it (i.e. its building, organisational structure, financials, products, campaigns etc.)?
- What symbols, stories, rituals, ideologies and artefacts have emerged and what do they say about the organisation?
- How large is the gap between what is claimed and the reality in the workplace? How strongly do managers and staff identify with the employer?
- What must be changed with regard to management style, career possibilities, information technology, customer service, compensation etc. in order to increase motivation and performance?

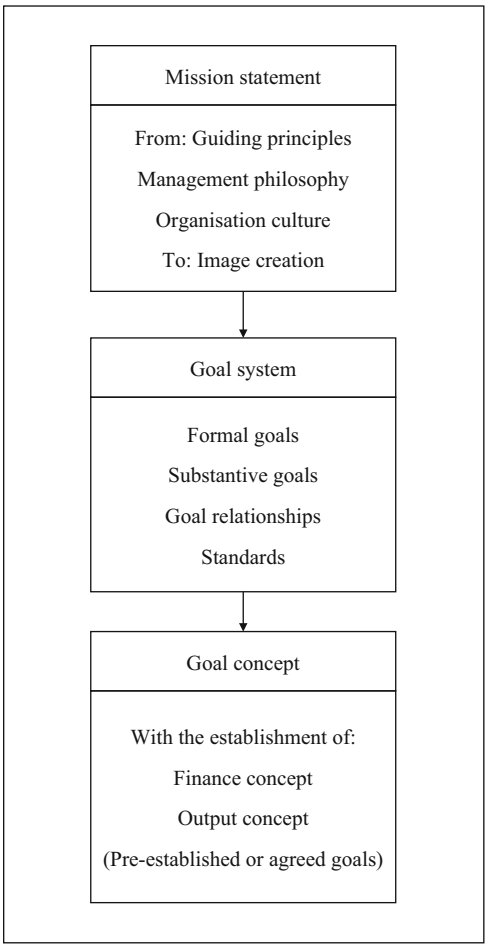

Fig. 5.5 Components of goal setting

The path leads from the guiding principles to the clarification of the goals system (which goals should be pursued and how are they connected to one another?) to the establishment of the goal concept, which is then used as a basis for setting goals about how the factors of production are to be used.

This process is illustrated in Fig. 5.5.

5.2 Input Factors

5.2.1 Partial Systems

A factor of production is a good with which other tangible or intangible goods can be produced. The result of operations depends on the factors of production, specifically on their combination in terms of input, quality, flexibility and intensity. This

yield is influenced by legal and other issues such as regulations, uncertainty, expectations, capabilities, structures, processes, strategies and management styles.

Sometimes these influences are so intertwined with the factors that they become intrinsic to them, as occurs for instance with **information**, which is often considered to be a separate production factor. This perspective can be misleading because information in its various forms allows us to capture the state of the factors and the outcomes related to their use. The various factors and resources can be combined with the help of expertise and know-how. **Place and time** are not factors themselves, but they do represent dimensions of production factors.

In classical economics, production factors are usually separated into three categories—**labour, land, capital** (but sometimes only two—**labour and capital**, where capital is understood as real capital which includes land). A few economists identify technical progress, or technological knowledge, as a factor due to its use for the production of new and improved products and production processes. Systemic and ecological criteria, however, cannot be classified in this way.

It is methodologically unsound to identify capital as a derivative production factor next to the two original factors (labour and land), and the inclusion of land in capital when identifying only two groups is also unsatisfactory. From an economics standpoint, capital contains produced goods, e.g. manufactured tools, machines, buildings. Land and natural resources only count as capital when they enter into production processes, e.g. in agricultural activities; mining for coal, iron ore, natural gas and oil; as landfills or for construction. In short, land becomes a capital good only when utility of flora, fauna, minerals and bodies of water are being exploited. What then become relevant are the **returns resulting** from the combination of the factors of production **and their distribution** in the form of pay, rent and interest. A framework for factors based on the discipline of economics permits the analysis of production functions, the modelling and explanation of input-output relationships and the measuring of national income and net national product.

One problem with the traditional factor system is that it ignores **resources and effects that occur outside the market**. It leaves out land and natural resources like natural habitats, animal and plant species diversity, clean water and air in their functions as the natural necessities of life. On top of that, volunteer work and other unpaid work, such as that of a household primary caregiver, are not considered by this factor system because it includes only factors that have a defined cost associated with them. This narrow outlook is adequate only with regard to short-term economic interests; it hinders rather than promotes long-term ecologically and socially responsible development. It is therefore necessary to establish a universal system that includes all input factors.

Even the currently used **system of operational production factors** is unsatisfactory. It identifies labour, production resources and raw materials as basic factors and sets them up against a management factor that can be sub-divided into areas of leadership, planning, execution and supervision. Erich Gutenberg (1897–1984) developed this approach, which has since been taken over by many, even though its focus is the industrial production process and it ignores nature. It is a management studies counterpart to the view of classical economics: both are one-sided.

It is difficult to avoid the impression that these systems deal with only those factors of production that pay out. A universally applicable, realistic and consistent system for understanding production factors must be able to take into account **imponderable factors** and at least attempt to measure them and evaluate them in monetary terms. Employee motivation, the expandability of machines and heat or noise during manufacturing processes are examples of aspects of factors that are difficult to capture. Fortunately, mathematical, statistical and technical tools are available to help in the quantification and monetary evaluation of such qualitative characteristics of the factors of production.

5.2.2 A Universal Factor System

A system that is applicable to all economic entities has **seven factors of production**: personnel, capital, material, energy, services, legislation and the natural environment. Although it is not necessarily obvious when considering each factor individually, all are necessary for the production of the majority of goods and services. The degree to which each factor is involved in the production process will differ, and between factors there can be substitution and complementary relationships. How, when and where these factors are used is dependent upon the goal concept and the desired product, the production process, work conditions, the factor costs, quality and combination effect.

Figure 5.6 shows this universal factor system with the important sub-factors and interdependences.

5.2.3 Personnel

Personnel as a factor is not restricted to those working for money; the term also includes those doing voluntary and unpaid labour. It should be noted that the output of personnel is most relevant for analysis of this factor, rather than their input—although the relationship between the two is not unimportant. Personnel carry out two main types of task: making decisions and executing them. Both a top manager and a technician set goals and make decisions, and at the same time must implement them. Personnel sits at the top of our system of factors because it is both a **factor in itself** and **combiner of factors**. It connects the other factors with each other and is a factor which itself is combined with other factors.

Personnel consists of managers, specialists, semiskilled and unskilled workers, a classification based on their **activities** and there are obviously overlaps between the groups. We can also use other criteria to classify personnel, such as: type of compensation (wages or salary, commission), status (blue-collar, staff, civil servant, freelancer), type of employment (full-time, part-time, seasonal) or phase of education (apprentice, trainee, intern, working student).

The size of the tertiary sector in all economies has grown rapidly over the last thirty years, while at the same time the importance of services associated with the

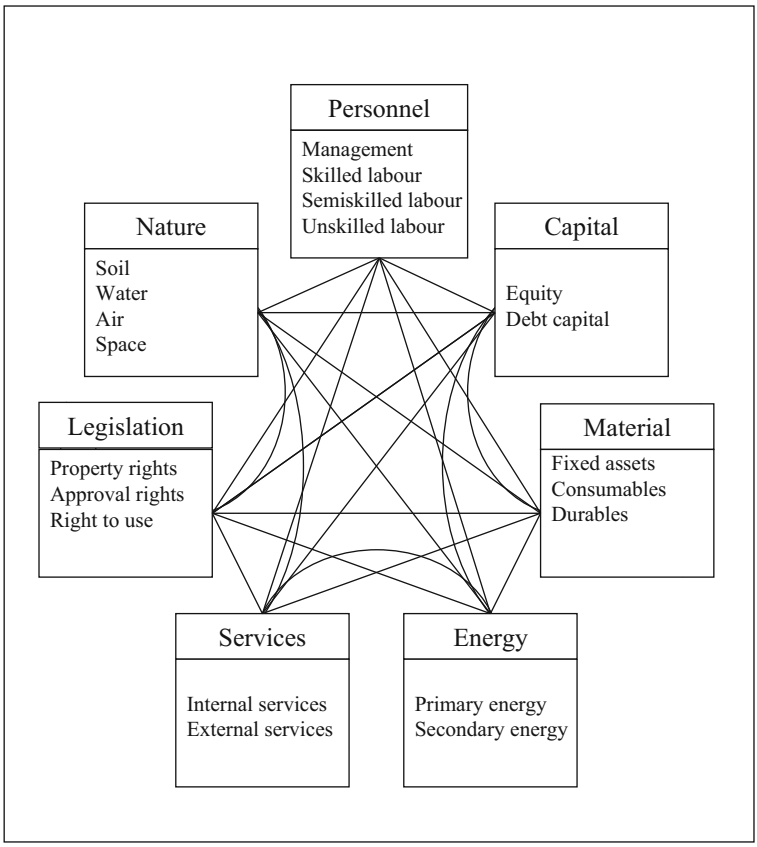

Fig. 5.6 A universal system of production factors

primary and secondary sectors of the economy has also greatly increased. The impact of these developments is that the personnel factor has become much more significant as a **determinant of costs** and as a **determinant of present and future performance**. Competition and globalisation have at the same time increased the pressure to increase productivity, meaning that the input:output relationship has changed and continues to do so—more output is now expected from the same input. The implication of this is that the quality of personnel has become central. Expert knowledge and intellectual, technical, communications, physical and psychological skills are in greater and greater demand.

5.2.4 Capital

Capital is essential in a non-barter economy. In the context of factors of production, capital does not mean the goods that have been produced, but **financial capital** (cash and banked funds), used for liquidity and investment in the form of equity and debt capital. This **monetary factor** includes financial resources and financial claims. On one side of the balance sheet of a company are equity and debt capital, and on the other side are tangible, intangible and financial assets (see Sect. 6.7.2 for more details).

Financial capital makes possible the purchase or the use of other production factors. Once capital reaches financial markets, it can then start to "perform" in the sense that it can generate income, just like the operational activities of a company. **Flows of goods and services** run in the opposite direction to **payment streams**. When a service is rendered or a product provided for no cost, there is no payment stream; similarly, when a payment is made without a direct connection to goods or services (as in the case of taxes), there is no flow in the opposite direction.

The legal rights of **capital providers** vary, depending on whether they are providing equity or debt capital, at least in the case of companies and households. When one thinks about capital, the main interest lies in the **sources of funds**, while when considering assets, it lies in the **use of resources** in the form of non-current tangible, intangible and financial assets (non-current assets), inventory, receivables and cash (current assets). Subtracting liabilities (debts, accounts payable) from total assets reveals the value of the equity: if liabilities are larger than assets, equity is negative.

5.2.5 Material

This factor of production covers **tangible assets**, including materials used in production. We can differentiate between different form of material, based on its use: fixed assets, durable goods, consumables and merchandise.

Fixed assets, often referred to in firms as capital goods, include: land, buildings, machinery, machine systems, production and commercial facilities. For public administrations, they include streets, dams, bridges, pipelines, water works, agricultural land and forests. Military assets are not normally included in official statistics.

Durable goods do not wear out quickly and are found in households, companies and public administrations. Examples are tools, vehicles, appliances, furniture, office and computer equipment.

While durables are used frequently, and generally over a long period of time, **consumables** can be only used once or just a few times. Examples are raw materials, auxiliary materials and operating materials as well as low value economic goods like office supplies, lubricants and packaging materials. Energy is excluded from this category, even though it is indeed a consumable, because its particular characteristics justify its identification as a factor of production in itself.

There are also semi-finished products and finished products, together referred to as **trade items**. They are often sold in the same state as which they were purchased—obvious examples of such goods are the products that are sold in shops.

The distinctions between the various kinds of assets are sometimes unclear and often depend upon legal considerations. The type of asset a good is classified to be can have repercussions for bookkeeping and accounting, and on tax bills (e.g. whether the value of an asset should be written off immediately or depreciated over a longer period).

5.2.6 Energy

An **intangible asset**, energy is the capacity to be active (in the physical sense); in essence it is stored work capacity. Energy sources are the materials and resources that lead to energy generation. Natural or **primary energy sources** include brown and black coal, mineral oil, natural gas, nuclear energy, biomass, geothermal energy, peat, water and wind energy, tidal energy and solar power. **Secondary energy sources** are developed through the conversion of primary energy sources in power plants, refineries and other facilities to useable forms such as hard coal, briquettes, gasoline, heating fuel, electricity, heat (steam and hot water) and compressed air.

The special features of energy as a factor of production are based on the **chemical and physical characteristics** of the form it takes. The ability to store it is limited or non-existent, and a delivery network is usually required to transport it. **Technical and legislative requirements** determine energy supply and demand. Network effects and company size are economic advantages in this sector, so there tends to be a development of natural monopolies of distribution for the types of energy that are transported over a network (electricity, gas and district heating), leading to a lack of direct competition.

5.2.7 Services

Services are one of the most frequently disregarded factors of production in previous models. They are an **intangible good** whose relevance for the combination of factors lies in intangible outputs. There are two forms of service: internal and external.

Internal services are provided by an economic entity itself. They are often closely linked to other factors, such as personnel, and it becomes difficult to separate them. In order to do so, it is helpful to ask the "make or buy" question (i.e. in-house provision or purchase from a third party): if a service activity can be outsourced, we can identify the service as being independent from other factors of production. Cleaning, repair, security and maintenance services that are run in-house can be included in the services factor of production. Work carried out for the senior management team, on the production line or behind the counter at a

bank should be assigned to the personnel factor, internal transport of parts to the material factor. Making these distinctions is not simply an academic exercise, because doing so makes it easier to analyse processes, calculate costs and make decisions about outsourcing, and is also helpful for controllership (see Sect. 9.1.6).

External services come from third parties and are used as part of the combining of factors; external services are sometimes needed for the creation of internal services. Without them, production may be impossible, so it is surprising that external services have, until recently, been forgotten in factor systems. Examples of external services include consultancy, information, planning and auditing services, services for writing, press and printing, and other office-related services, manual services, exploration, research, development, education, financial and insurance-related services, travel agencies, hotels, transportation services, postal services and telecommunications. We should not forget that public administrations also provide services in the form of roads, footpaths, city squares, bridges, harbours, canals etc.

The service provider delivers paid-for or free services, not a tangible good. Among the issues associated with this factor are the complementary nature of services for other factors, the difficulties in explaining the value of the service, the quality of the service, its assessment and ensuring its delivery, the fact that a service is often provided and consumed simultaneously, the impossibility of storing services and (in some cases) their location-bound nature.

5.2.8 Legislation

Although both are **intangible factors of production**, we should differentiate between *legislation* and *services*. Legislation as a factor of production includes property rights and also approval and usage rights, but general rights such as the right to found a company or to use parking spaces are excluded, as these form part of the overall legal framework.

Property rights can be understood as the right to make decisions about objects. Owners or trustees in companies, associations, public authorities and courts exercise these rights, which are exercised carrying out activities related to purchasing, sales, job contracts, declarations of surety, proxy voting, shareholder meetings, land registration, donations, foundations, wills and testaments, expropriations etc. Legal rights may not necessarily correspond to actual rights—ownership is not the same as possession—so a third-party may be allowed to make use of property.

Approvals take many forms and are relevant for many areas of economic activity. Market entry may need authorisation, operating licences may be necessary for some activities, and processes, facilities, materials and people may require permits or licences. Getting approvals can represent a major bottleneck for factor combination. Typically (and theoretically) they cannot simply be bought and their granting is highly dependent upon legislation, regulations, legal interpretations and court decisions. Approvals generally depend on meeting certain obligations. Approvals influence decisions about location, for if an organisation cannot get the

necessary approvals at a particular place or within a certain timeframe, or if the catalogue of obligations is found to be too extensive, or if the obligations are not as onerous elsewhere, the organisation may decide to move production to the location where requirements are perceived to be less onerous and the authorities more responsive and more efficient.

The granting of **rights of use** is equally important in factor combination. Rights of use encompass activities like searching for and mining natural resources, the use of public highways, the use of rental and lease property, the use of patents for technical innovations (patent law), the exploitation of works of art, literature, music and science (copyright) as well as the use and protection of trademarks.

Dealing with property rights, approvals and rights to use means working with various systems of rules and standards and leads to more or less complicated contracts and going through official application and approval processes. Because of the ever-increasing importance of this production factor, which is the result of growing juridification, the accompanying **transaction costs** are become more and more relevant to economic considerations. These costs arise from information gathering, applications, travel, preparing tenders, waiting time, preparatory work, negotiations, finalising and monitoring contracts, as well as from making sure that contractual obligations are met.

5.2.9 Nature

Nature refers to the natural basis of existence of **humans, animals and plants** and there is no factor combination that does not involve nature! Nevertheless, previous factor systems have ignored it despite its indispensability. **Earth, water, air and space** are directly or indirectly involved in the production process, from its beginning with the use of one or more factors of production to its end-product (development, manufacturing, storage, transport) and beyond (disposal, reuse, recycling).

Figure 5.7 shows the four areas and in more detail.

We can use earth to demonstrate which uses can result in negative external effects (Fig. 5.8) and show the associated external and operational costs (Fig. 5.9).

There exist not only negative external effects; positive external effects also exist, as when reforestation leads to improvements in air quality. Characteristic of **external effects** is that they occur outside the market, often without compensation and unnoticed—not least because causes and effects are often distant from each other in space and time. Even when a price has to be paid for making use of nature (e.g. waste disposal fees), this is essentially based on supply and demand. Producers and consumers are primarily interested in the price-performance ratio, and not in the overall relationship between the use of factors of production and pollution, with its impact on the balance of nature, health and quality of life. Only the internalisation of these environmental effects through rules and prohibitions, fees and incentives, will lead the responsible parties to take them into account when they are doing their cost calculations. Otherwise, those responsible for problems will be spared, but external costs will arise that nobody will pay specifically but which must

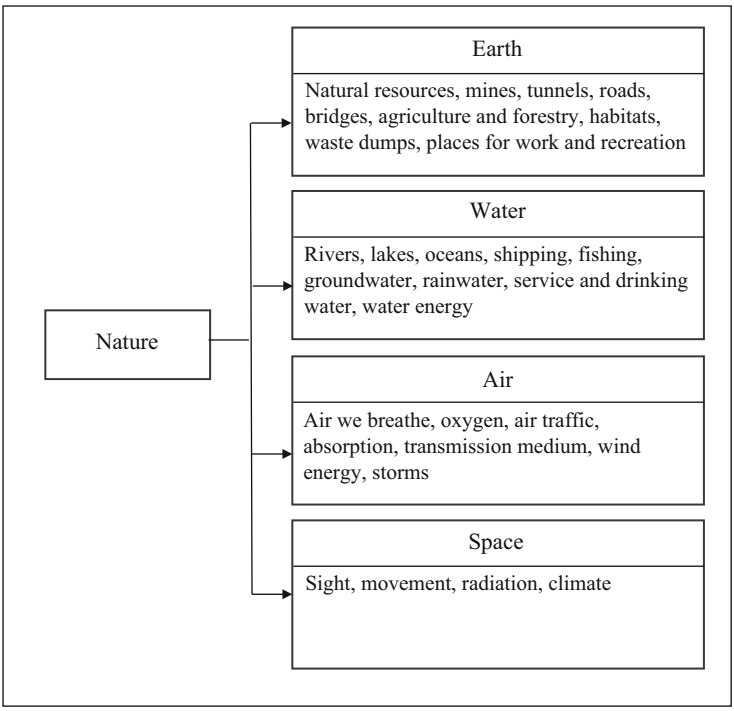

Fig. 5.7 The four areas of nature

be borne by all. Because of their seriousness, these negative external effects are at the forefront of developments in theory and practice.

These **(external) diseconomies** are shown in Figs. 5.10 and 5.11.

External diseconomies come during production, consumption and storage. Many negative or harmful joint products emerge during **production**: waste and hazardous materials as well as undesirable side-effects like humidity, dryness, cold, heat, smog, noise, gases, odours, sparks, disturbances, subsidence etc. These diseconomies can occur during regular production as the result of an accident or over a period of time. They can affect those involved in production and those not involved, as well as animals, plants and the environment in general; examples include work-related illness (silicosis, eczema, radiation damage etc.), noise pollution, soil contamination, contamination and climate change. These diseconomies mean more time, effort and money have had to be put into labour, health and environmental protection.

Diseconomies also occur during **consumption**—the use and consumption of goods and services, like driving a car, taking a flight, going on holiday, going to a concert or sports event. Consumption often means waste from packaging materials but can also be accompanied by other undesirable effects such as poor nutrition, sedentariness, stress and addiction—this is exemplified by the popular image of computer game players sitting for hours in front of their monitor, eating pizza and

Fig. 5.8 Negative effects of use of the earth

Earth is…	Negative effects…
explored	groundwater contamination
removed	damage to biotope
dug up	ground subsidence
exhausted	groundwater contamination
excavated	soil erosion
cleared	damage to water reservoirs
terraced	soil erosion
relocated	damage to biotope
drained	-
channeled	groundwater level sinks
levelled	damage to natural cycles
sealed	groundwater level sinks
ploughed	-
harrowed	-
planted	-
drilled	-
fertilised	soil acidification
irrigated	-
grazed	-
dammed	damage to natural cycles
cultivated	damage to natural cycles
stored	groundwater contamination
accumulated	soil displacement
concentrated	damage to natural cycles
contaminated	damage to natural resources
decontaminated	waste of energy
cleaned	waste of energy
mined	fallow land
sieved	·
ventilated	·
·	·
·	·
·	·

being unable to stop playing. The reaction to such effects has also been the development of measures for health and environmental protection.

Storage also causes diseconomies. Places where goods are stored include the warehouses used in procurement, production and sales and distribution. Associated with warehouses, with public dumps and landfills are problems such as energy use and the dangerous nature of the materials stored or dumped. Long-term security and safety is important for storage spaces that hold waste—external diseconomies are just waiting to happen—building waste poses a long-term threat to the groundwater, for example, while nuclear waste must be safely stored for hundreds of years, a thought which does not inspire 100% confidence.

Many approaches to slowing down or stopping the emergence of external diseconomies are based on raising the cost of using nature as a factor of production. And what is true for nature also holds for the other factors of production in respect to their capacity to damage the environment through external diseconomies: they

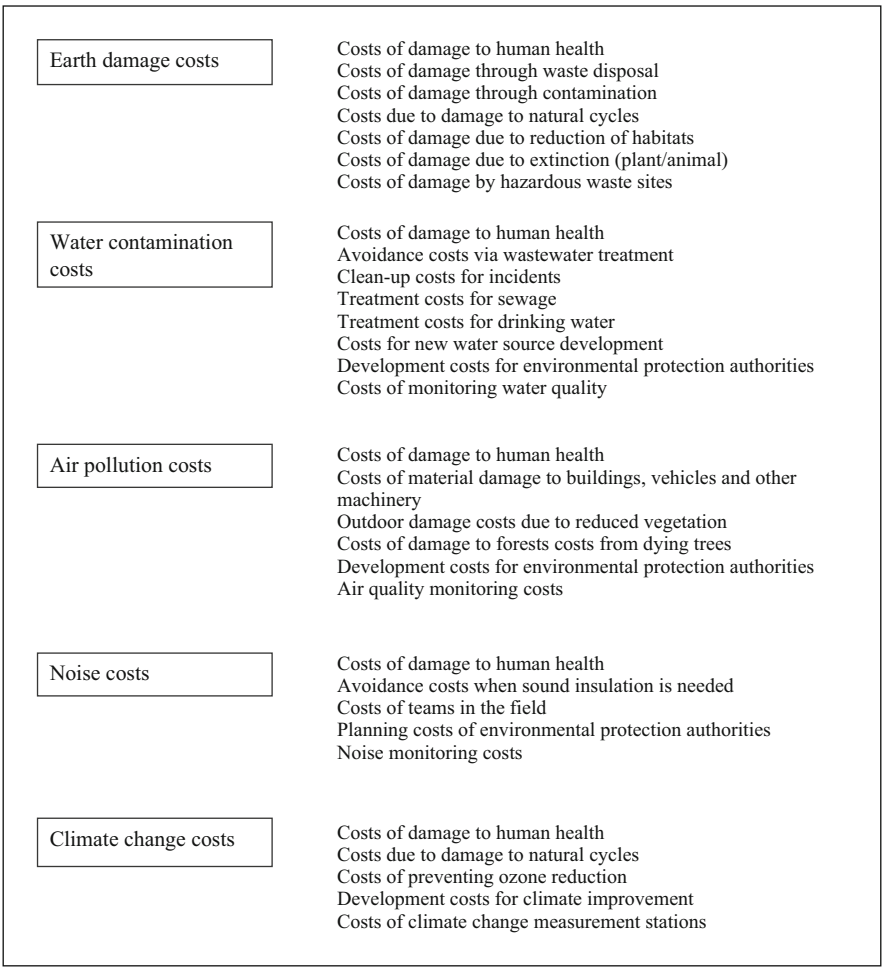

Fig. 5.9 Cost types associated with the appropriation of nature

are simply too cheap. It is unfortunately true that countries trying to go it alone to make the factors of production more expensive in order to protect the environment soon meet resistance in the form of international competition.

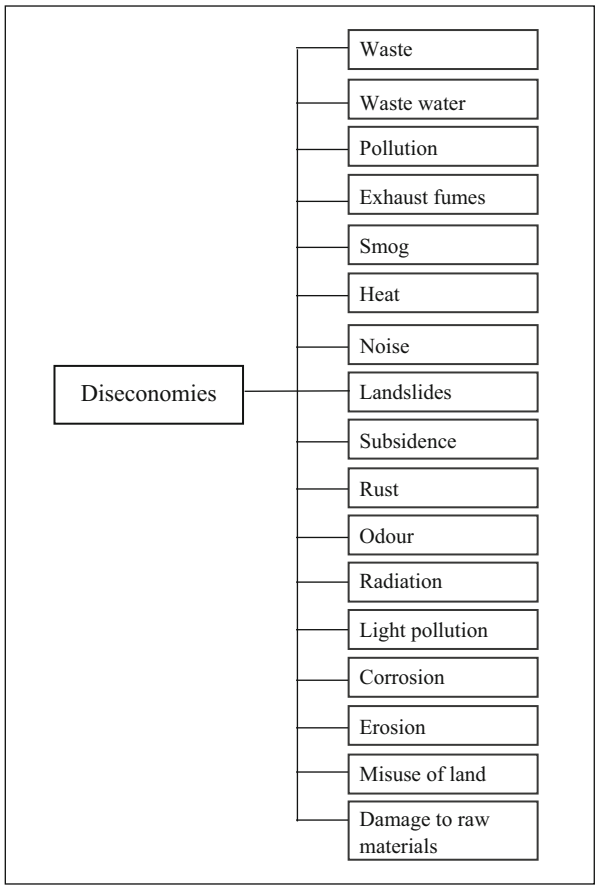

Fig. 5.10 Overview of diseconomies

5.3 Factor Input

5.3.1 Factor Requirements

Prior to the input of the production factors it is necessary to establish the quantity of the factor required. The difficulty inherent in this sort of analysis can be exemplified by **personnel requirements,** which specify needs in terms of number of employees, the tasks they need to carry out and the required knowledge, skills and attributes, the number of hours they should work and so on. Needs analysis can be either input or output orientated, depending upon whether supply or demand is the starting point. In other words: what is the requirement for employees if the current production programme and methods are changed or reorganised? What happens if sales increase or decrease? Particularly tricky is predicting the requirements for knowledge-based tasks and other services. What amount of

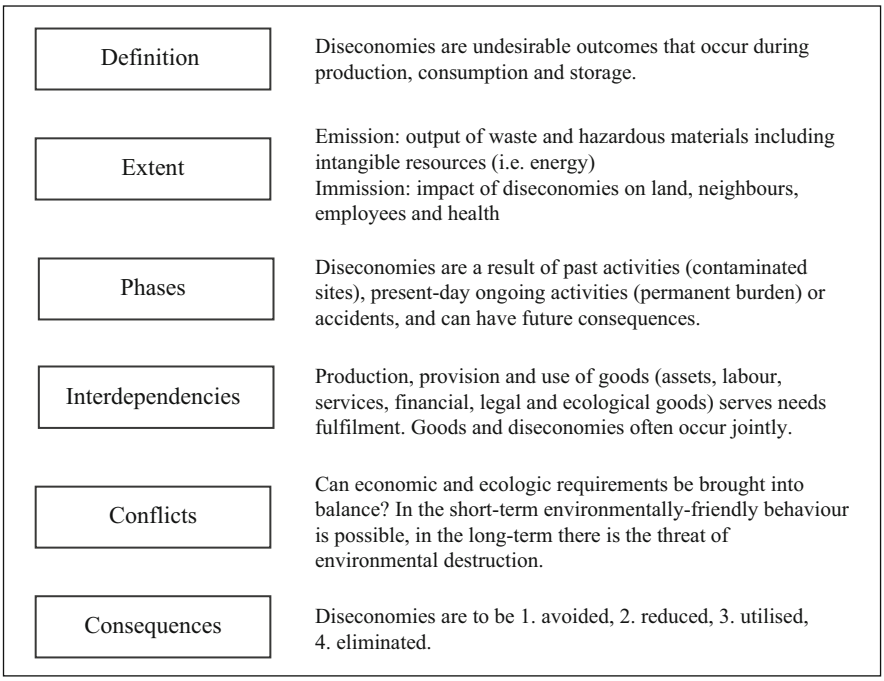

Fig. 5.11 Characteristics of diseconomies

personnel, what sort of qualifications are necessary for a growing architecture firm, a hotel, software house, insurance company, labour inspectorate or social assistance authority? In order to answer such questions, it is important to determine to what extent changes are due to operational matters or structural issues.

Short-term or long-term employee requirements (**target capacity**) first must be compared to the actual amount of personnel available (**actual capacity**) and the gap eliminated. This can be done within or between departments or divisions, or by getting resources from outside. A gap may develop because of increases or decreases in demand generally or seasonally, too much or little inventory, contract termination, cancellation, accidents, illness etc. Human resource management activities such as transfers, relocations and promotions may themselves lead to further requirements. It is not enough simply to know how many employees and what type of work force is required, because personnel requirements must also be **economically justifiable**. Generally, the needs for a factor depend on its contribution to meeting goals, and the personnel factor is only measurable when the output of the employees can be defined and compared with the costs of producing the output.

Organisations use various accounting procedures to capture costs, as discussed in Chap. 7, otherwise it is difficult to be precise about personnel requirements, and this is also true of the other production factors (except for capital). Capital structure is determined by the goals that have been set—this is the operative purpose, as outlined

in a mission statement, for example—and by the intended size of the business. Based on this, a calculation is made about how much capital is necessary (capital requirements), how long it will be needed for (term) and from where it can be obtained (source). This issue can be approached from the opposite direction, when capital is already available and needs to be put to work. To ascertain **capital requirements,** it is necessary to differentiate between one-time capital needs, e.g. for a new investment, and continuous capital requirements for operative processes.

The question of **capital maturity** is answered by considering the commitment period for the relevant assets, or, coming from the other direction, looking at the capital investment and commitment period of alternative investment possibilities. A common guideline is that fixed assets should be financed using long-term capital. The higher the capitalisation ratio (the relationship between fixed and total assets), the larger the proportion of the long-term capital within total capital. Equity and long-term debt capital are the ideal choice for the long term financing of fixed assets, because with short-term debt capital financing of fixed assets, the length of the credit is shorter than the time need for their liquidation. In order to bridge this gap, credits must be extended and in extreme situations, revolving credit must be requested. The **coverage ratio** measures the coverage of fixed assets by long-term capital.

Unlike fixed assets, current assets can be financed through short-term debt capital, which can be measured by liquidity ratios. Three such ratios exist—the cash ratio, the quick ratio and the current ratio measure the relationship between short-term financial assets and short-term liabilities. They are described and discussed in Sect. 6.2.2.

Financial means must be available in the right quantity, at the right time and at the lowest cost—underfinancing and expensive capital should be avoided. The requirements for an optimal capital structure suggest that the return on equity can be increased by taking on debt capital to the point where the interest on it reaches the same level as the rate of return of total capital. This leveraging of increased debt on the return on equity is referred to as the **leverage effect**—the lower the ratio of equity capital to total capital, the higher the return on equity, the higher the risk and the lower the financial security.

The sources of capital depend on the legal status of the capital provider and the market chosen. A fundamental distinction is between **equity and debt financing**; equity capital is added in the form of shares, stocks and cooperative share and debt capital in the form of credits, loans and bonds. Equity financing occurs when associations increase fees and contributions or administrations collect taxes, when money is donated to an economic entity as well as when profits and surpluses are retained. Equity capital must cover debts owed, and can allow its owners voting rights and a right to distributed profits. Debt financing takes place through the credit markets.

A second fundamental distinction is between **internal and external financing**. External financing is when capital comes from financial or equity markets, although is some situations finance is arranged outside them, such as when an angel investor puts money into a company. The sources of internal financing exist in the

non-financial market, i.e. the market where sales revenues are sought. Reserves, provisions and accruals can be built from sales revenues, and this frees up capital temporarily for financing the reorganising of asset structures and asset growth. Asset growth can otherwise be accomplished through a further type of internal financing—profit retention. The dues and membership fees of an association or union can be used to finance activities that are free of charge.

Tax considerations are important from the point of view of economic efficiency when it comes to choosing the type and source of finance. Economic efficiency can only be achieved within the existing legal and regulatory framework. However, other considerations need not be ignored, particularly ethics. Companies large and small always aim for tax efficiency, but this can lead to situations where companies like Amazon, Google and Microsoft pay very little tax despite generating billions in sales.

5.3.2 Factor Procurement

The recruiting of personnel, the raising of capital, purchasing of land, purchasing of machinery, acquisition of office equipment, raw and process materials, using postal services and public infrastructure, the obtaining of official approvals and the use of natural resources all involve the procurement of factors. Regardless of their characteristics, differences in the procurement of factors reside in the nature of **supply and demand** on the market. There are regulated or unregulated, domestic or foreign, competitive or monopolistic markets. Some are better organised than others, and some are more transparent with more available information than others. Technical, legal, geographic and time-related issues can also be important in this respect.

Those responsible for must look for **factor procurement alternatives** and answer questions like: Which types of factors are required, in which quantity and quality, where and when? Is the offer value for money? When making a decision about which factors are to be procured, one may be making a choice between similar (technical employees) and dissimilar factors (people or machines). A fundamental question is: make or buy? In other words, does it make sense for a firm to produce its own components or buy them? Should it hire permanent staff or get workers from an agency?

A second set of questions relates to the **procurement process**. In addition to determining the procurement objective and factor requirements, factor procurement itself must be planned and assessed. Important issues include procurement market research, planning (e.g. using models to find the optimal purchasing quantity), budgeting (finding the right combination of order size and order frequency to minimise procurement costs), procurement marketing, cooperation with third parties and the procurement of tenders. Procurement of the various factors involves supplier selection, the selection of applicants and contract negotiations, the checking of invoices and of the quantities and quality of what has been procured. The procurement process ends with the provision of factors for factor combination.

Economic efficiency and effectiveness in procurement also depend upon the **procurement organisation**. In addition to the questions of what is procured and how, the question of who does the procuring must be answered. Generally, procurement has centralised and decentralised components, i.e. people at headquarters and in the branch offices. The degree of centralisation depends on several factors, including how closely procurement is tied to production and distribution, whether specific areas of responsibility can be identified, whether common or individual interests should dominate, and whether economies of scale are more or less important than flexibility and responsiveness—the former calls for centralisation, the latter for decentralisation. In practice there tends to be a mixed form where central procurement specialists are responsible for basic contracts and the procurement of costly and/or infrequently used factors, while people located outside the main procurement department deal with the rest.

5.3.3 Factor Combination

Bringing factors together is factor combination. In the **broader sense** this occurs in all areas, functions and processes of economic entities. In the **narrower sense** factor combination is equivalent to the production of the goods and services which require the factors to actually be created. This definition also includes storage, transport, actual production completion, disposal and includes research and production-related administration. In an even narrower sense, factor combination refers to the main factors, i.e. humans and machines. Productivity is very frequently used as an indicator for factor combination, providing a quotient that is a quantity derived from input (e.g. number of employees) and output (e.g. total amount of steel produced) as shown in Eq. (5.1).

$$Productivity = \frac{Output\ quantity}{Input\ quantity} \tag{5.1}$$

Equation 5.1 Productivity

Which relationships exist between the quantities of production factors and produced products is captured in the **production functions** developed in production theory with its assumptions, models and conclusions. The areas investigated include the contribution of individual factors and homogeneity of factors, single and multiple stage production, forecasting with different levels of confidence, factors that can be substituted (or not), and limited and total analyses.

Cost functions assess and calculate factor costs. Because the quantity of factor input is dependent upon manufacturing capacity, cost functions reflect the dependency of cost on manufacturing capacity. The objective of cost theory is to supplement the quantity-based framework of production theory with a value-based framework. A straightforward example of this is the multiplication of the quantity

produced by the sales price, where the result is the revenue. Cost functions are important for determining such information as minimal cost combination, which is the lowest cost factor input combination for a substitutional production function.

The analysis of cost determinants, cost drivers and cost trends is of practical relevance. Some **cost determinants, such as tax and employment laws and regulations relating to health and safety, opening hours or other issues relevant to specific factors,** cannot be influenced by an economic entity. Although the cost of factors may not be easy or even impossible to influence, it remains an action variable, as when large orders are subject to volume discounts. There are, of course, a number of influential cost determinants. Costs are especially dependent upon capacity (influenced by company size and production conditions), the volume of output (notably the production programme, order size and level of activity) and the qualities of the factors.

Figure 5.12 provides an overview of cost determinants.

Seeing costs as a piece of data that cannot be changed or as an action variable is quite fundamental. Indeed, cost determinants that cannot be influenced because they are set by law can be avoided by relocation abroad, for example. At the same time, past decisions about company size—an action variable—have such a long-term effect that the action variable is an item of data that cannot be influenced.

Among the most relevant issues related to **cost trends** are how costs are constructed (e.g. legal requirements), how the relationships between direct and overhead costs, and variable and fixed costs, develop, which cost reduction measures are promising, or where cost inertia exists (e.g. how quickly costs fall in the face of declining production). Closely related to cost trends are first, the types of production processes (e.g. batch manufacturing or assembly-line production) and central or decentral information processing, second, the production conditions in the workplace and third, how much value is added.

5.4 Types of Result

5.4.1 Causal Relationships

Analysis of economic efficiency and effectiveness is in essence the analysis of the effects of economic activities. Efforts are made to explain cause-effect relationships because a causal relationship means that *if*... *then* and functional dependencies exist, and these serve as a foundation for decision making. In management, the investigation of causal relationships is part of a **weak point analysis**. This involves a constant process of discovering and removing bottlenecks so that goals can be achieved. Erich Gutenberg referred to planning as a compensatory activity in which overall planning has to be orientated to that of the weakest areas. Companies' plans often aim to remove weak points, and of course, the removal of one is always an invitation to search for the next one—this is one of the basic points of Total Quality Management.

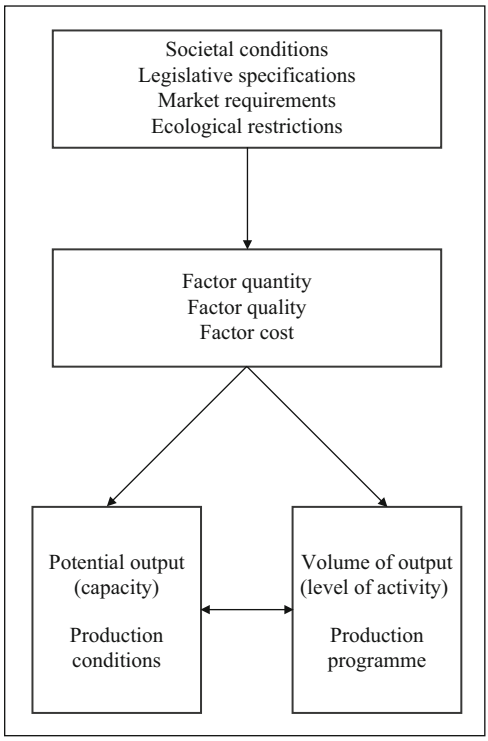

Fig. 5.12 Cost determinants

When customers, suppliers, users, employees or other stakeholders are dissatisfied, the causes need to be found. The immediate problem that has been identified should be viewed as a symptom and not a disease, and the root cause must be discovered.

Figure 5.13 includes a selection of the areas where investigation could begin.

One difficulty is that there is rarely a single cause, but usually a variety of contributing factors. No less complex is understanding effects, as the next section shows in its discussion of the three forms effects can take: output, outcome, impact.

5.4.2 Outputs

One result of factor combination is the output of tangible and intangible goods of all kinds. There is a continuum—a restaurant serves food and drink, which are tangible goods, but the act of cooking and serving dishes is a service, i.e. an intangible good. The books are the product of a printer, a practice session with a teacher the product of a driving school, advice and expertise the products of consultants, tax audits are the products of a tax office, regulations the products of ministries etc.

One most often concentrates on the **main outputs**, but these often necessarily involve **secondary outputs** in the form of goods and/or services. For instance, a

Management: goal system, goal agreement and target setting, planning and control system, controllership, information management, management philosophy

Organisation: organisational culture, span of control, division of responsibilities, space for decision making, business processes, optimal company size

Personnel: human resources requirements, assessment and recruitment, allocation, (junior) staff development, job satisfaction and workplace environment, cost consciousness, incentives, knowledge and creativity

Financials: budgets, liquidity planning and follow-up costs, finance, insurance, cost accounting, cost-benefit analysis

Production: factor utility, capacity utilisation, turnover rate, optimal purchasing quantity, logistics and storage, production scheduling and control, quality assurance, maintenance, rationalisation, in and outsourcing.

Marketing: corporate identity, product, price, distribution and communications politics, portfolio mix

Fig. 5.13 Potential sources of weaknesses

restaurant's secondary outputs include ambience, service, accessibility and parking spaces.

Adding together all outputs provides the **total output**. To speak in monetary terms, it includes not just the revenues generated by sales, but also what has been put in the warehouse, what has been produced for the firm's own use, as well as other operating earnings. Statements, and the resulting conclusions, about the efficiency and effectiveness of the production of outputs depend on several factors—which costs are allocated and how, which outputs are evaluated and how, and which costs are allocated to which outputs and how.

5.4.3 Outcomes

Analyses of efficiency and effectiveness are not unproblematic and complications arise when we think about input-output relationships in a wider context than the market. It is not straightforward to find answers to questions about outcomes: How large is the benefit for society and for the economy as a whole of the medications for influenza that have been sold? Was the cultural mission of the municipal theatre completed? Was the broadcaster able to communicate the desired social values?

Beyond this, it is important to remember that **diseconomies** can also be a result of factor combination. They are often neglected or hastily described as imponderable, but just as imponderable input factors must not be ignored, neither should imponderable effects. For example, transportation by car, train, boat or aeroplane always causes pollution. Even if transportation services can be provided at a low economic cost, the **emissions** for which they are responsible cause external costs

that can tilt the balance in terms of overall—not just economic—efficiency and effectiveness.

5.4.4 Impacts

Building on the question about the benefit of medications, we need to ask questions like: How large is the benefit of the medicines on the health of the patient? Does their impact satisfy the general public?

External diseconomies are also relevant here. Emissions can be significant, as can **immissions** caused by waste, air pollution, residual heat, waste water, radioactive and other hazardous materials. If the external costs of the production and consumption of a good can be calculated, and if they are found to be significant, they can then be compared in economic efficiency and outcome-impact analyses with the operative costs, to which they can be added, so that an overall picture of costs and benefits emerges.

Figures 5.14 and 5.15 present what has been so far discussed in this chapter in a summary form and also point towards the next topic—measuring and valuing effects.

5.5 Measurement of Results

5.5.1 Indicators

The initial objective of casual analyses is to determine **what** should be measured and the follow-up question is **how** it should be measured. Attention needs to be paid to the types of effect an activity has, and then to which indicators should be used as quantitative targets. The choice of indicators must always follow a critical examination of the assumptions that underlie them and the desired goals.

Physical or technical indicators are often useful in economic efficiency and effectiveness analyses of *if. . . then* and *means:end* relationships. For instance: data about the quantity produced per employee or per hour says something about productivity, the yield of a particular field helps establish land output, the cost-revenue relationship makes it possible to draw conclusions about the success of a product, cost accounting of the value of production factors used in a period helps with the analysis of the return on capital invested.

It is more difficult with **qualitative characteristics**. Which indicators can be used to measure the workplace environment, for example? Are sick leave or the fluctuation rate relevant? Or can employee satisfaction be assessed by considering unpaid overtime, participation in company outings or works council elections?

Technically, product quality is a question of durability. Economically, product quality is measured by looking at the degree it is accepted by consumers or its anticipated profitable lifespan. These are **profit-oriented indicators; needs-**

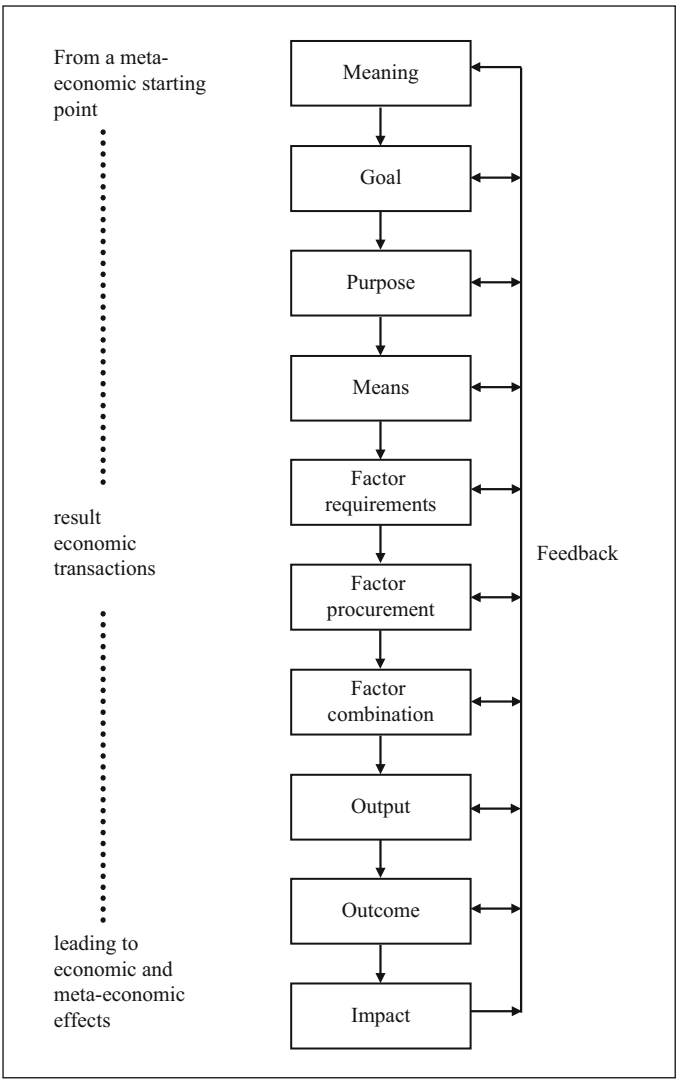

Fig. 5.14 Ten steps from meaning to realisation

economy indicators of product quality are, for example, the universal provision of goods or services and the equal treatment of clients.

Such considerations lead to making a distinction between **operational and social indicators** in an economic entity. To be more concrete: employment of a safety engineer incurs costs and this employee's work performance is measured by a reduction in work-place accidents and injuries, reduced accident-related costs as well as a reduction in disruptions in production and sick-leave costs incurred by the employer. In addition to these operative indicators there are also the social

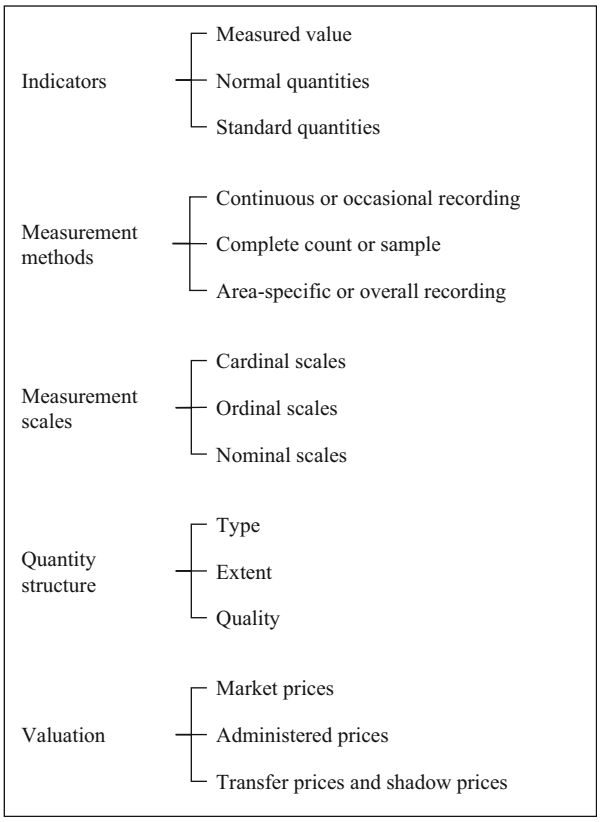

Fig. 5.15 Measurement and valuation of effects

indicators which deal with the results of the accident prevention measures for those potentially affected (health, ability to work, health insurance, realised income) and third parties (dependents, hospitals, rehabilitation centres, unions as well as accident insurance and retirement insurance). These indicators allow the company to judge the success of the programme and its benefits.

Company success as captured in operative indicators can be seen as a contribution to the social product and the social benefits as a contribution to qualitative growth. It would therefore be reasonable to define operational and social indicators of an individual business entity as **institutional** and to speak of macroeconomics only when operational or social indicators are **aggregated**.

It is important to note that indicators can be used not only as tools for measurement but also as benchmarks (averages, trends), and standards (norms or targets).

5.5.2 Measurement Methods

The step after deciding **what** to measure is understanding **how** to measure. **Different measurement methods** must be implemented, depending upon what is to be assessed. Among the options are continuous or intermittent measuring, complete counts or samples. Tools used include observation, survey, experiments, instruments (software programmes, laboratory test equipment, measurement stations, scales, timers etc.) and meters.

To be acceptable, **a measurement method** must meet four criteria:

- objectivity, in order for it to be transparent,
- reliability, which is achieved when the same conditions always produce the same result,
- validity, i.e. the method measures what it is supposed to measure, and
- economic efficiency and effectiveness compared to other possibilities.

The last criterion is not easy to establish; a rule of thumb is that the more precise the measurement should be, the more expensive it is. Consideration therefore needs to be given to the degree of accuracy required.

5.5.3 Measurement Scales

Measurements need scales. **Cardinal scales** exist in two forms. The ratio scale—a classic example is a ruler—is best suited for economic analyses because it has a defined zero, can be used for measuring quantities and prices and is based on addition or subtraction. For example, the number of completed hours multiplied by the hourly pay results in total pay, or number of hours saved by a new method multiplied by hourly pay provides the time saved in monetary terms. An interval scale—e.g. the temperature scale—also has a defined zero and shows differences between two points. For example, the investment risk for one proposal is twice as high as that of another proposal, or employees are awarded scores of ten, nine and five points for their performance.

Ordinal scales can be used to indicate intensities, the size or strength of individual measures as quantitative characteristics in a ranked order. An example of such a scale is a hardness scale with hardness grades 0–30 for water or hardness levels from 1–10 for minerals. For example, a dichotomous ordinal scale allows for a choice to be made between sick and healthy, right and wrong. A non-dichotomous scale is used in marketing for example, where respondents are asked to say whether they completely agree, agree, disagree of completely disagree with a statement.

The measurement scales that are generally the least helpful are **nominal scales**, which can only determine if a given measurement belongs to one of several groups. For example, in software engineering a bug can be said to be caused by problem with a variable or with memory allocation.

5.5.4 Quantity Structure

Efforts to quantitatively summarise internal or external effects need a quantity structure, which is best explained using the example of cost accounting. Costs are established by multiplying the quantities of production factors used as inputs by their price. When the **volume component** of the costs is examined, it becomes clear that the quantities of factors needed for production are dependent upon the factors' characteristics.

The **provision and use of capacities** in the areas of personnel, capital, materials, energy, services, legislation and nature must relate to the size of contracts or production quantities, because they are usually a major factor in fixed costs. How can peak demand be covered or how can employee turnover be dealt with? Is internal adaptation possible or is contracting out or outsourcing necessary?

5.5.5 Valuation

A prerequisite of economic efficiency and effectiveness analyses are measurements of visitor numbers, exhibition space, staff, production units, storage space, work times, patients treated, permits issued, and so on and so forth. In conjunction with factor and product prices they allow statements about economic and business activities to be made.

Market prices develop though supply and demand in competition. Because there is by no means constant competition, market or price mechanisms can partially or completely fail, as when monopolies and monopoly prices exist. In this case, the degree of economic efficiency and effectiveness cannot be unambiguously calculated, but must be worked out with the help of assumptions. Industry and cost comparisons between regional and national monopolies are helpful in such circumstances.

Far too little attention is paid in price theory to **administered prices**. They are politically determined and implemented when market mechanisms lead to socially unwanted outcomes. Administered prices are determined and can be controlled by international and national parliaments and authorities, contracting partners in national industry-union negotiations, chambers and professional bodies, municipal councils and administrations. Administrative prices are found mainly in agriculture, water and waste water services, electricity, heating and gas, waste disposal, transportation (including trains, trams, buses, airports, inland and sea ports and navigable waters), broadcasting, post and telecommunications as well as health, culture and administration. When administrative prices play a significant role for a business entity, its economic efficiency and effectiveness can only be estimated.

Transfer prices are often used for internal analyses. They are used to value and coordinate internal services, and serve to connect interdependent units to overall goals. Transfer prices have a directive function and they make it possible to see the contribution of an organisational unit to overall success.

Sometimes there exists no price that can be used to carry out an analysis of the economic efficiency and effectiveness of volunteer work, unpaid services, further education and training, environmental protection measures and so on. In such cases **shadow prices** are used. Such fictive prices help establish the most optimal allocation of limited factors for given needs. Decisions about quantity are always closely related to decisions about price, as the quantity of a good determines its value, and price of a good determines the quantity.

5.6 Examples and Exercises

5.6.1 Factor Requirements: Personnel

Situation
Detlef Schulz is the manager of cleaning services at one of the largest hotels in Berlin. It has 1100 rooms on sixteen floors; 300 of the bedrooms are single rooms, 750 are double rooms and there are 50 suites. The hotel has three restaurants, two bars and ten meeting rooms. He has been asked to calculate how many cleaning staff are needed.

Solution
Detlef, an experienced manager, knows that he must do more than multiply the number of rooms by the expected productivity rate, so he proceeds as follows:

- He divides the building into areas that have similar requirements in terms of cleaning. His list has three groupings: bedrooms, lobby and meeting rooms, bars and restaurants.
- Next he works out how big is the area that needs to be cleaned and what must be cleaned (e.g. 200 sq.m. of carpet in the lobby, 20 sq.m of carpet in the single rooms, one bathroom per room etc.)
- He now identifies in more detail exactly what needs doing. In a bedroom, for example, the bed must be made (or changed if the guest checks out), the bathroom cleaned, the carpet vacuumed, the furniture dusted and so on.
- Knowing how long it should take for each task and the number of times the task must be performed on a daily or weekly basis, he is now in a position to calculate labour hours. If, for instance, the carpet in the lobby must be vacuumed three times a day, and it takes 20 minutes each time, he knows how many labour hours he needs for this activity. It takes 50 minutes to clean the meeting rooms on average, a total of 8 hours 20 minutes; since the contracts of the cleaners are for 8 hours per day, he knows that he will either need to employ a second person, part of whose responsibilities will include the meeting rooms, or pay a little overtime.
- With this information, he is now in a position to determine the cost of labour by multiplying the number of hours needed for a task by the gross pay of the person who carries it out.

He is also aware that finding cleaning staff is not easy. There is high fluctuation because the pay is poor and the hours are unsocial. A further complication is that hotel occupancy varies over the year between 80% and 100%. If he employs enough staff so that the busiest times of the year are covered, he will be in a situation where some staff are idle when the hotel is not so busy.

Detlef decides that he will employ enough permanent staff so that they can cover 70% occupancy. The flexibility he needs will come from a contract he will sign with a job agency that is in a position to provide staff at very short notice, which will help Detlef deal with peaks and troughs in the demand for cleaning services and also with the high fluctuation. To counteract the fluctuation he reaches an agreement with the hotel's General manager that the hotel will pay 10% more than the standard rate. Detlef hopes this will make the hotel a more attractive employer and reduce cleaning staff turnover.

5.6.2 Measuring Productivity

Situation

Matthias Barthel has to produce the monthly productivity report for the board of directors of a small manufacturing company. He opens the email he received with the following data:

Units produced	200,000
Labour hours	20,000
Machine hours	10,000
Cost of materials	70,000€
Cost of energy	30,000€
Average labour cost	30/h€
Average machine usage rate	20/h€

What can he calculate?

Solution

1.	Labour productivity = Output ÷ Labour hours = 200,000 ÷ 20,000 = 10 units/h
2.	Machine productivity = Output ÷ Machine hours = 200,000 ÷ 10,000 = 20 units/h
3.	Overall (multifactor) productivity = Output ÷ (Labour costs + Machine costs + Material costs + Energy costs) = 200,000 ÷ ((20,000 * 30€) + (10,000 * 20€) + 70,000€ + 30,000€) = 200,000 ÷ 900,000€ = 0.22 units per € spent

5.6.3 Root Cause Investigation

Situation
Anja Schwarz runs the delivery fleet of a soft drink manufacturer and has noticed that the fuel consumption of the new lorries she has just leased is below what she was expecting. She want to find out why.

Solution
She decides to do a root cause analysis on the basis that poor fuel consumption is a symptom of an underlying problem. She identifies the following possible reasons:

- Machinery
  - Underinflated types
  - Engine badly adjusted
- Materials
  - Wrong kind of oil used to lubricate
  - Wrong octane level petrol used
- People
  - Poor maintenance
  - Poor driving habits
- Methods
  - Driving too fast
  - Not using gears properly

After further investigation, she realises that the drivers did not realise that they needed to change gears less frequently than on the older lorries. This, of course, raises the question of why they did not know, so she continues her investigation and discovers that no training was offered. Naturally, she needs to find out why that was the case and it emerges that the human resource department, which is responsible for training, was missing some key resources. The HR manager takes over to understand why key resources were missing. . ..

The lesson here, reflects Anja, is that a symptom like poor fuel consumption can have deep-lying causes.

5.6.4 MyCompany Project

The cafe has now been in existence for 6 months and you are pleased with progress so far, indeed, you are even thinking of opening a second cafe.

Goals
The possibility of expansion has caused you to think again about the goals you have set for yourself. The first goal you had was simply to survive, but now other goals might be added. For example, what goals do you have for yourself? You had to borrow money from friends and family to start up—do they have any influence on

the goals you have? At the moment, you don't need to buy very much, what might some relevant goals for procurement be? You now employ some staff—what goals could you have in the area of personnel?

Generally—what are your formal goals and what are your substantive goals? What do your finance and solutions concepts look like?

If you could summarise what your business is all about in a mission statement, what would it say?

Factors of Production

The chapter describes a universal system of factors of production: personnel, capital, material, energy, services, the law and the natural environment.

Give an example for each of these factors that is relevant for your cafe. Does your business have any diseconomies? if so, which ones and what could you do about them?

You employ people to serve in the cafe. How can you decide how many you need, when you need them and how much it will all cost?

Causal Relationships

At the moment you are slightly concerned because a situation has arisen where some of your customers are unhappy because their coffee is too cold. You offer to put it in a microwave and—somewhat to your surprise—the customers agree to this. It happens too frequently for your liking, so you investigate. Where do you think the reasons might lie?

Indicators

The chapter discusses the importance of indicators. Which ones apply to your business? What could you measure in a cup of coffee? (Hint: there are at least four variables—see end of chapter.)

5.6.5 Self-Test Questions

- *What are the different goal types of economic entities?*
- *Describe the "magic triangle".*
- *Which goals dominate the goal system of public administrations?*
- *What are the components of a goal concept?*
- *What is the function of a mission statement and what aspects should be considered in its development?*
- *What sub-factors are included in the universal system of production factors?*
- *What are assets?*
- *What characterises internal services?*
- *Give examples of external services.*
- *What is meant by licensing?*
- *What costs can arise due to effects on nature and natural resources?*
- *What are external diseconomies?*

– *How can personnel requirements be determined?*
– *What is meant by coverage rate?*
– *What factors shape the organisation of procurement?*
– *What is the relationship described by the production function?*
– *What are outcome and impact in the context of an efficiency analysis?*
– *What are the different kinds of scale and when are they used?*
– *Why are administrative prices useful?*

Answer to cup of coffee question: you could measure the quantity, temperature, taste, aroma, time it took to prepare, cleanliness of the cup and saucer.