Logistics Controlling

11

Learning Objectives

Theoretical and practical insights in modern accounting suggest that the rating of logistics services and costs as well as comprehensive controlling in logistics and supply chain management are a central prerequisite for Logistics Controlling and Performance. The following chapter gives an overview about the current situation and the development of cost and performance accounting in logistics. Additionally, key figures and key figure systems will be introduced with respect to logistical tasks. Apart from these basics, more elaborate approaches to comprehensive supply chain controlling and performance management in the field of logistics will introduce the reader to current challenges in company practice. The author introduce the prevalent German appellation *Controlling* as a synonym for *Managerial Accounting* which is rather used in Anglo-American literature

Keywords

- Cost and performance accounting
- Functions and the process of Controlling
- Key figure systems
- Key Performance Indicators (KPI)
- Supply Chain Controlling
- Cost drivers and cost effects
- Process costs and process performance
- Balanced scorecard

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11.1 Conceptual Basics

In today's complex and widely connected world and its multitude of quantitative and qualitative data and information, successful company management requires tools to rate, plane, and control processes. All measures to acquire, develop, assess, and rate such control information and transfer them to concrete courses of action can be summed up as the instrument of *Controlling*. In this context, Controlling is not only to be understood as an instrument of control but as one of information and management for executive levels.[1] Planning, control, and analysis as well as information derived from them are elementary functions of Controlling for management (see Fig. 11.1). These Controlling functions can be used in all areas and on all levels of a company. They are as useful for the whole company as they are for the logistics department.

In academics as well as in business practice, the term Controlling has a very wide area of application and various contents. Additionally, the form of Controlling depends largely on the size of the company. The acquisition, preparation, and control of the data and information happen in the company process according to an hierarchical order: from the individual operative and administrative business processes, and the accounting for cost and performance accounting to, eventually, the Controlling, resulting in detailed assessment and proposals for action.

Missing data to evaluate processes and an overrating of the significance of data about business process results or an unreflecting focus on insights from Controlling instruments have repeatedly led to wrong management decisions in the past.

This shows the challenges Controlling faces in business practice. Its quantitative results clearly have a supporting function in business process rating and controlling. However, it should not limit management decisions with respect to their flexible

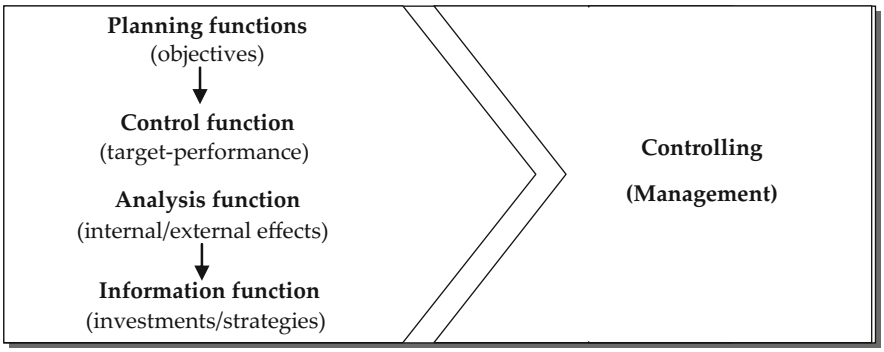

Fig. 11.1 Basic functions of controlling

[1] Cf. Weber (2002b), p. 5.

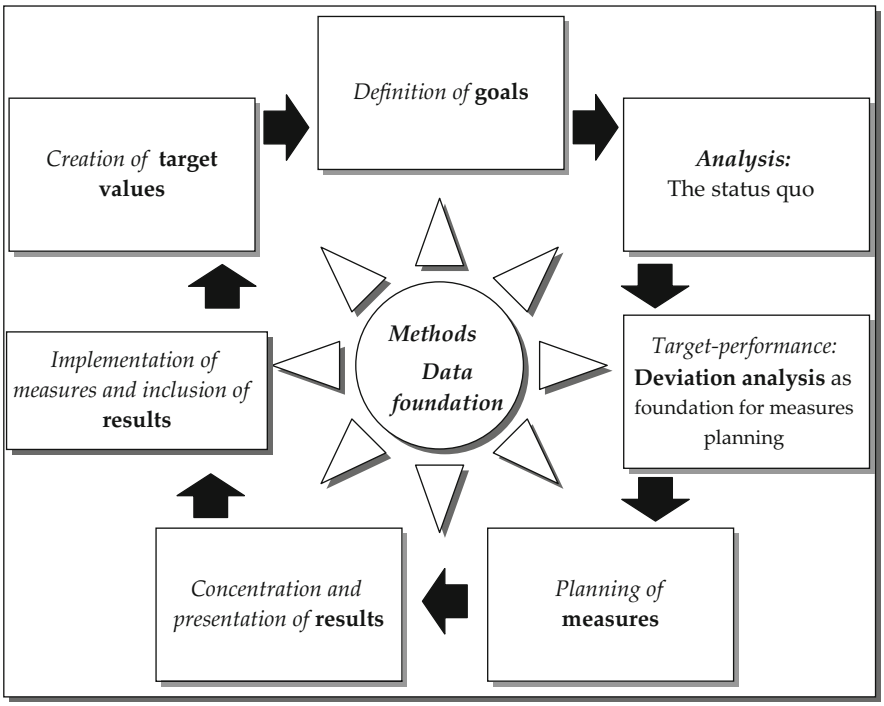

Fig. 11.2 The controlling process (Cf. Kiesel (1997), p. 346)

reaction to market realities and an additional qualitative assessment of market and customer requirements.

Controlling is a continuous process that works with mathematical and statistical methods and can be supported by numerous IT systems. Usually, these systems are connected with or integrated in other IT systems in the company. Controlling processes are often designed as a control circuit as shown in Fig. 11.2.

Looking at the field of employment for Controlling in a logistical context, a distinction has to be made between logistics controlling as the task of one department and the Controlling for logistics service providers. The latter is the same as general Controlling for companies and will not be described in detail here. The following refers to aspects from Controlling as a concrete function.

In addition to the realization of services, the rationalization of transport, handling, warehousing, and additional services is a continuous task of logistics.[2] This means that the core task of logistics controlling is to support the management in controlling and managing logistical processes. Contributing to cost reduction and efficiency increase is as important as the aspect of control.

[2] Cf. Klaus (2002), p. 30.

The use of Controlling instruments for logistical processes in business practices is not yet adequate. The problem that occurs most often is the unsatisfying level of precision in assigning logistics costs to the logistics services that caused them.[3] One reason for this is the high effort and the difficulty that is necessary to acquire data for logistical processes. A second reason is the increased difficulty to establish stable systems for data acquisition because of tasks changing quickly with varying customer requirements. Due to the strong influence of shareholders and financial investors, individual parts of the logistics process may be affected by events or measures such as mergers or outsourcing.

Owing to the diversity of logistical processes, it is not possible to define Controlling concepts that apply to logistics as a whole. Such concepts must always be tailored to the special requirements and the individual situation in which logistics processes take place.[4]

The goals of logistics controlling can be defined as:

- Formulating and specifying logistical goals and their integration in the context of the whole company
- Budgeting and creating targets for logistics
- Making available instruments with operational value to create targets and, subsequently, measure success
- Supporting and coordinating strategic and operative logistics planning like e.g. investment decisions
- Regulations and information transparency for cost and performance accounting for logistics and its processes
- Foundation for cost control and efficiency increase (performance) in logistics
- Formulating further management information, e.g. concerning the organizational structure or staff leadership

Analogue to the process- or network-oriented logistics in supply chains, additional logistics controlling must be active across steps in the value chain. To assess the economic efficiency of a full supply chain or a complex logistics network, Controlling instruments must be universally used. Such cases are called Supply Chain Controlling; it is a controlling instrument of Supply Chain Management.[5] The fact that the Controlling process must be viewed across numerous steps in the value-adding process which means across companies or even countries is another challenge for the unified source-based assignation of logistics services and costs.

[3] Cf. Straube et al. (2005), p. 26.

[4] Cf. Weber (2002b), p. 13.

[5] Cf. Stölzle and Otto (2003), p. 29 et seq.

11.2 Logistical Costs and Performance Accounting

With the processing of cost and performance information, first data aggregation takes place via the cost types, cost center, and cost unit accounting. Connecting the performance (output) to the resulting costs (factor input) and their source-based definition takes place in accounting (see Fig. 11.3).

To improve the quality and significance of Logistical Costs and Performance Accounting, it makes sense to differentiate in detail the logistical cost types as early as when they are acquired. In the field of transport, for example, it is possible to differentiate between the cost types parcel service, forwarder, or own transport fleet. As cost centers, transport costs can, for example, be differentiated between purchasing transports, transports between sites of the own company, and delivery transports to customers.

Cost Center Accounting connects individual costs (e.g. from production) to the full costs; this also means calculating the share of logistical costs in the costs for a certain product. More differentiation means a higher quality of the source-based detection of the logistics costs for a certain product. The term product, in this context, can have a wide range of meaning. Usually, it means products as the result of industrial production. However, it can also mean *service products* (transport, storing orders) that are the subject of Cost Center Accounting.

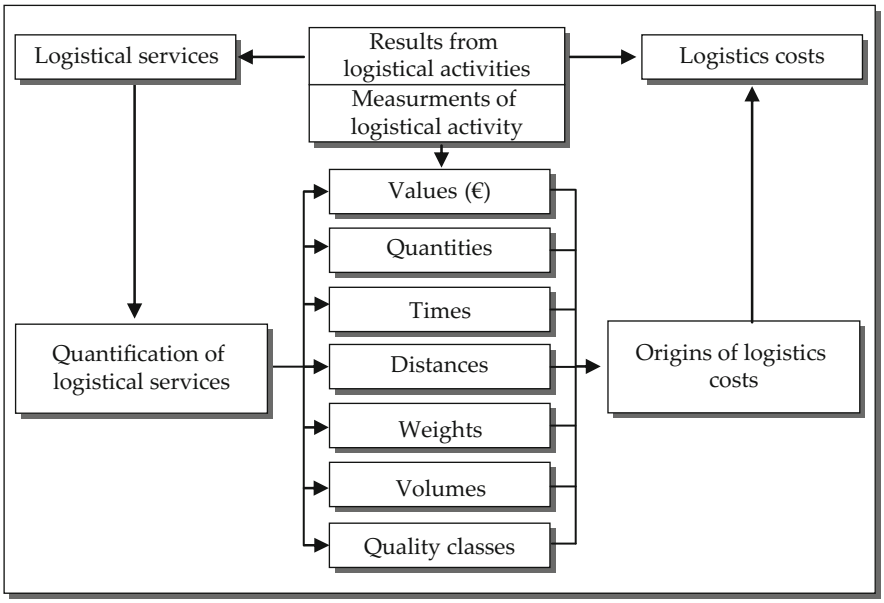

Fig. 11.3 Characteristics of logistical activities (Cf. Reichmann (2006), p. 420)

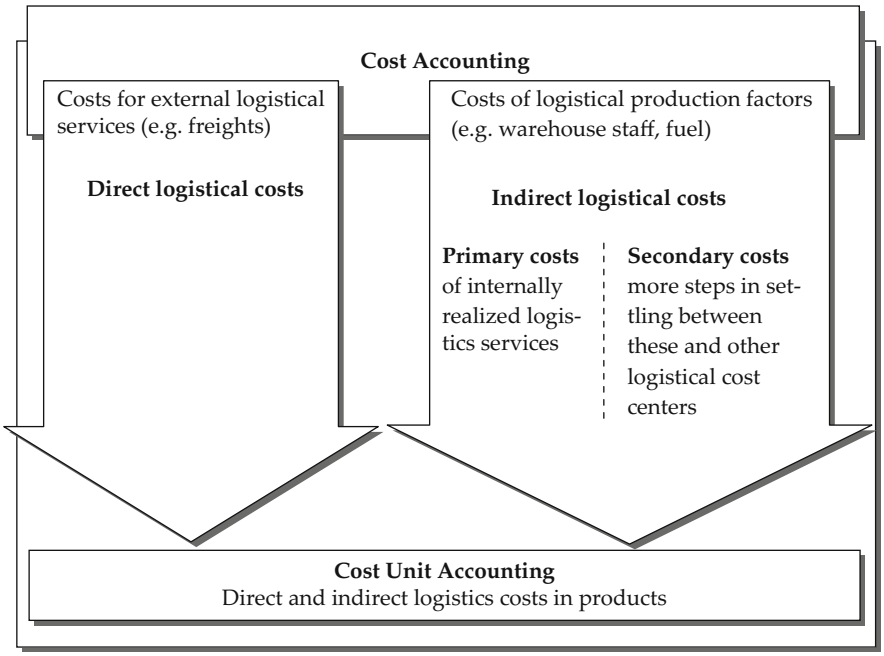

Fig. 11.4 Traditional integration of logistics in cost accounting (Cf. Weber (2002b), p. 107)

These results are directly included into calculating the contribution margin or into price calculation. They may also be the foundation of activity-based costing (see Sect. 11.4.1) (see Fig. 11.4).

Basic elements of logistics costs are:

- Order processing costs
- Transport costs for covering distances in the logistical process
- Warehouse costs, for covering time in the logistical process
- Stock costs
- Control and system costs, for logistical control, administration and IT used in logistics

The following Table 11.1 outlines the logistical cost blocks and their characteristics regarding their variability for changes in the logistics volume.

Logistics costs are mostly accounted for in external accounting from a perspective of taxes or financial accounting. However, logistics performance must be dealt with by internal accounting. The key to a high-quality result is the precise recording of performance in logistical processes. Prior to such a performance recording, the goal of this measure should always be clarified.

Table 11.1 Basic scheme of logistics costs

Category	Description	Price elasticity	Type of costs
Order processing	Receipt of customer orders, realization of orders (picking, packaging, transport), customer contact during the process (tracking & tracing), order completion	Fixed/variable	Staff, material costs
Transport (internal)	Own transport fleet	Fixed/variable	Staff (e.g. driver), material costs (e.g. write-down for truck, fuel)
Transport (external)	Forwarder/service provider	Variable	Material costs (e.g. invoices from forwarders)
Warehouse capacity	Warehouse/equipment	Step-fixed/variable	Staff (e.g. technicians), material costs (e.g. rent, loan, write-down)
Warehouse handling	Staff	Fixed/variable	Staff, material costs (e.g. write-off forklift)
Stock costs	Interests on fixed capital	Variable	Material costs (e.g. interest on credits)
Control, management, system costs	Logistics management, warehouse accountant, warehouse management system	Fixed	Staff (e.g. warehouse manager), material costs (e.g. writedown management system)

The following questions have to be clarified, and the following regulations have to be made – also in cases where performance recording happens automatically or with IT support:[6]

- Definition of the performance to be recorded
- Process-oriented description of the performance and the extent of recording
- Frequency of the recording (every hour, daily, randomly etc.)
- Location and sources of performance recording

Table 11.2 Portion of logistics costs, compared by sectors (Cf. Straube et al. (2005), p. 301)

Sector/market	Portion of logistics costs (% of turnover)
Food	8.0 %
Chemistry	6.9 %
General engineering	6.0 %
High Tech/ Electronics	5.2 %
Automotive	5.1 %

[6] Cf. Weber (2001), p. 67.

A study by the *Bundesvereinigung Logistik* (German Logistics Association) gives ideas about the size of logistics costs in different sectors. On average, the share of logistical costs in the complete turnover of a company is between 5 and 8 % (see Table 11.2).

11.3 Key Figure Systems

The data acquired from Logistical Cost and Performance Accounting often have a large volume. To be able to use this information for control or analysis as continuing control information or as a foundation for management decisions, it has to be compressed. Usually, the results from compression are key figure systems. All information and key figures about the overall system company and its parts are collected in a reporting system. In this context, the term *Performance Management* is often used. It shows the performance of the logistics system and the costs connected to this.

In particular, ratio systems describe the result of logistics from a compilation of actual data. However, they can also be prepared as planning or target values for a certain business period. In order to gain significance, key figures must never be created and assessed individually but should always have the form of a system consisting of more key figures. They should be comparable with respect to their content, the calculation method, and the time period during which they were acquired.

In a company in general, but also in specific for the logistics department, a key figure system performs the following tasks[7]:

- Quantification of company and logistics goals as guidelines to comply with the budget, increase efficiency, or lower costs in logistical processes and as a foundation for target agreements with the management (operationalization function)
- Continuous comparison of the logistical processes (actual values) with the given target values as a part of internal control (control function)
- Systematic analysis of the deviation between actual and target values as well as of the periodic or aperiodic internal vulnerability and efficiency analysis (analyzing function)
- Analysis of external developments
- Analysis of the company situation compared to that of other companies or comparable logistical processes
- Support for decisions about countermeasures in case of deviations between target and actual values; assessment of possibilities to expand the logistical capacity (regulation function)

[7] Cf. Grochla (1983), p. 51.

To ensure valid comparability, the following principles should be kept in mind for working with key figures[8]:

- Clear quantification of key figures and the corresponding basic data
- Significance through connection or comparison with other key figures
- Appropriate relation between information value benefit and effort/costs of determination i.e. selection of a limited number of significant key figures
- No standardized key figures but key figures tailored to the company's requirements
- No individual key figures but sensible key figure systems for internal, inter-company, or periodic comparisons
- Clear (graphic) presentation of the key figures
- Explanation and interpretation of the key figures, e.g. with respect to internal and external factors of influence

Figure 11.5 shows the requirements for key figures regarding calculation and administration.

These requirements for the acquisition of key figures show again that high accuracy must be ensured for these activities and that reasonable comparisons

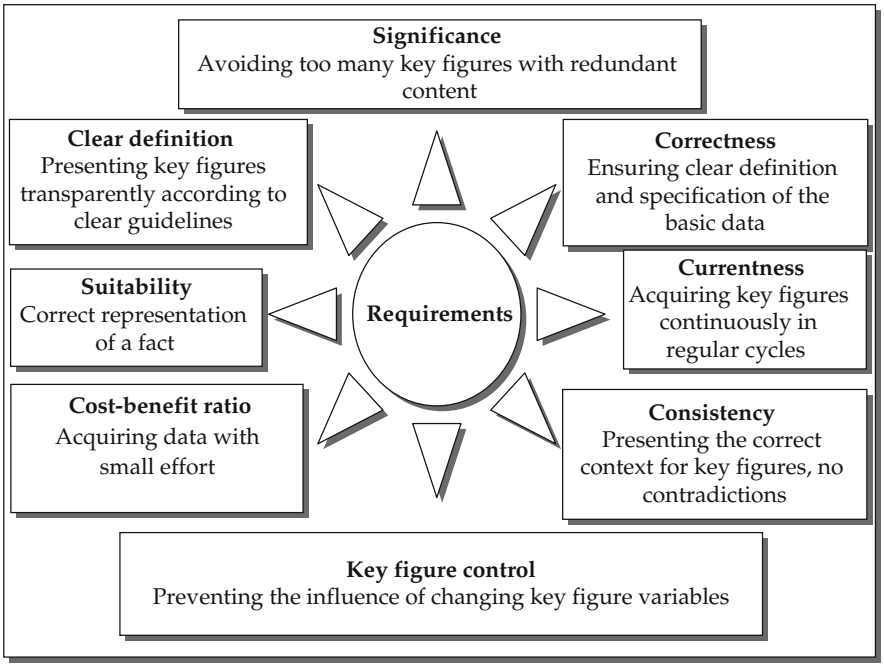

Fig. 11.5 Requirements for key figures (Cf. Friemuth et al. (1997), p. 98)

[8] Cf. Grochla (1983), p. 61 f.

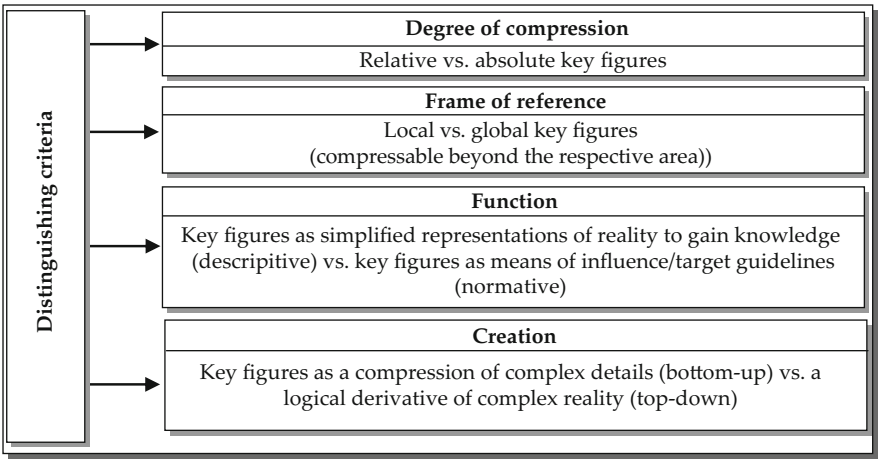

Fig. 11.6 Distinguishing criteria for key figures (Cf. Weber (2001), p. 229)

and results are only possible with key figure systems, i.e. in a combination of several key figures. On the other hand, the number of key figures should be limited to ensure clarity and to win clear insights for success-critical processes or process elements in logistics. In this context, the term *Key Performance Indicator* (KPI) has been established.

The criteria presented in Fig. 11.6 can be distinguished for the differentiation of key figures. Relative key figures are clearer but to concretely describe facts, absolute key figures are essential. The frame of reference can also be different and is often connected to the hierarchical level for which the corresponding key figures are to be a foundation for decisions.

However, to assess the logistical efficiency, linking relative and absolute key figures can be useful. Furthermore, a distinction between key figures that are used for continuous efficiency control and key figures that are to be principle targets for logistics planning can be made. Largely connected to this is the question how the key figures were created. Mostly, there is a compression of information from the operative level (bottom-up) upwards to the company as a whole. If the key figures have a guideline function, this happens the other way round (top-down). Logistical key figure systems can be divided into four categories, with respect to their content (see Fig. 11.7).

Structural key figures describe a logistics system by its size, form, and performance potential. They are absolute key figures without further input or output reference.

Productivity key figures show the performance capability of logistics.

Economic efficiency key figures rate efficient factor input. They assess the logistical performance with the necessary costs. These key figures are connected to monetary values in currency units that mostly refer to defined periods.

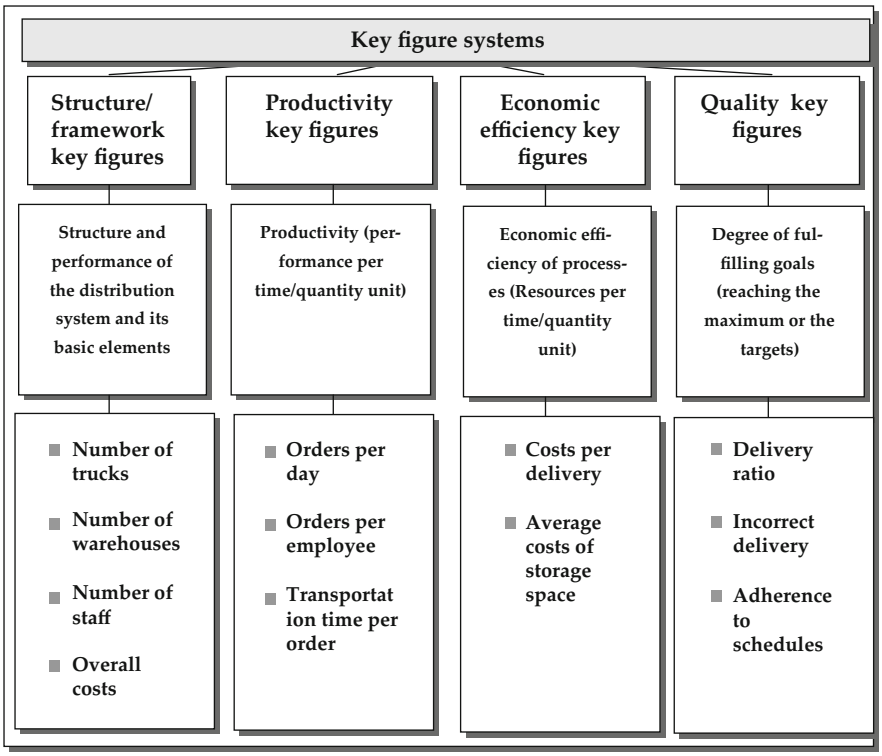

Fig. 11.7 Logistical key figure system (Cf. Gleißner (2000), p. 96)

Quality key figures show the degree to which goals in logistics performance were reached. Usually, a comparison with the target values from the planning phase takes place.[9]

Case Study 11.1: Key Performance Indicators

Lafarge Roofing Components GmbH in Oberursel, Germany, produces parts for rooftops – e.g. roof gutters, ventilation elements, roof windows, etc. – for the globally active sales companies of the Lafarge Roofing Group. It has production plants in Germany, Estonia, South Africa, and Malaysia. The global purchasing of commercial goods like solar modules for rooftops is an integral part of the operation. The two central warehouse locations are in Germany.

The central logistical task is bringing the production output or the commercial goods to the central warehouses and, subsequently, delivering to the warehouses

[9] Cf. Schulte (2009), p. 646 et seq.

of the sales companies worldwide. The terms of delivery are usually *ex works*, i.e. the costs must be borne by the sales companies. To control the logistics system, a key figure system is employed. It is divided into three parts:

- Costs
- Delivery Capacity Indicators
- Working Capital

The goal of this representation is the creation of cost transparency for the logistical processes in the organization.

The most important *framework key figures* are the absolute costs per time unit, i.e. the sum of all incoming and outgoing freight (shuttles from the plant to the warehouse, delivery to the sales companies); the capacity costs (rent for the external warehouse, write-downs for the internal warehouse); the handling costs (costs per incoming/outgoing goods for the external warehouse, staff costs for the internal warehouse, packaging); and the costs for central management functions (strategic purchasing, planning and scheduling, warehouse management). The costs are compared to the corresponding planning values and those from the previous year. In case of significant differences, additional ad-hoc analyses are conducted to clarify the reasons for this. Doing so, values, e.g. quantity, productivity, and price effects are shown separately (*productivity and economic efficiency key figures).*

The most important *quality key figure* is called *WOTIF* (Work on Time in Full). It shows to which percentage the goods were ready to be picked up in a warehouse location at the agreed time. It is calculated for every production site or commercial good and can be broken down to the level of individual items. Also in this case, significant deviation from the target values is analyzed. Subsequently, controlling measures are drawn up with the production planners of the sites or the suppliers.

Another key figure to assess delivery quality is the *planning accuracy* of the individual sales companies (deviation ordered quantity to actually picked-up quantity in per cent per time unit). If it deviates from the standard tolerance, it can also influence the WOTIF key figure. The key figure planning accuracy is the subject of controlling meetings with the sales companies.

The actual stock quantity is compared to the target values and those from the previous year to assess working capital (see Chap. 10). For this, raw materials, semi-finished products, and finished products are assessed individually per production site. The separate assessment of the actual values corresponds to the different persons responsible for different stocks within the organization. For example, the raw material management department or the production-planning department in the plants is responsible for the raw material and semi-finished goods stock; the logistics-planning department is responsible for the so-called make-to-stock items.

Days of Stock (DOS) is another key figure for stock controlling. It is calculated as follows:

$$\text{DOS (days)} = \text{size of stock}(€)/\text{turnover}(€) \times 360(\text{days})$$

Compared to planning values and values from the previous year, this key figure provides information about the warehouse handling frequency or the range of the stock.

When the results from the Logistical Cost and Performance Accounting are prepared and available for Controlling, the structure described above is sufficient to create a multitude of key figures about the logistical process or the logistical environment. That is why a systematic approach to working with key figures is necessary; their use should be limited to a small number of key figures that are directly aimed at the target KPI.

While working with KPI's certain limits to the use of key figures should be considered:[10]

- Key figure inflation, i.e. when too many key figures with largely the same content are created; often, the creation effort and the significance do not have a favorable ratio
- Mistakes because of imprecise definition and specification of the basic data
- A lack of consistence of key figures; contradicting statements or key figures that clearly do not have a connection to each other
- Problems with the direct or indirect key figure control, i.e. it is possible to manipulate key figures by changing activity variables, e.g. during the acquisition, in a way that critical insights can be covered

To avoid key figure inflation, to make the results from Controlling easy to use for the management, and to present interpretation approaches to the management, the Balanced Score Card (BSC) system was developed.[11] The BSC is a structured and balanced key figure system that usually looks at a company from four different perspectives with a cause-effect relationship:[12]

- Financial perspective (turnover, ROI, logistics costs, transport fleet costs etc.)
- Customer perspective (degree of delivery service, incorrect delivery ratio, loss ratio etc.)
- Business process perspective (order processing time, average warehouse handling time, average stock etc.)
- Learning and development perspective (fluctuation ratio, employee satisfaction, proposals for improvement etc.)

[10] Cf. Schulte (2009), p. 667 et seq.

[11] Cf. Kaplan and Norton (1997), p. 7 et seq.

[12] Cf. Vahrenkamp (2007), p. 432.

Initially designed for top-management as a basis for assessment and decision-making for the full company process and its context, the BSC is nowadays used for logistical tasks as well.

With traditional key figure systems usually comparing internal or external contents and/or different performance periods, the BSC is the first system to connect KPIs from different areas of the company process to its environment. The goal of such an alternative way of compiling KPIs – that show certain or potential factors of influence – is to be able to recognize connections or effects in other areas of company activity.[13] If, for example, there is a cost increase per

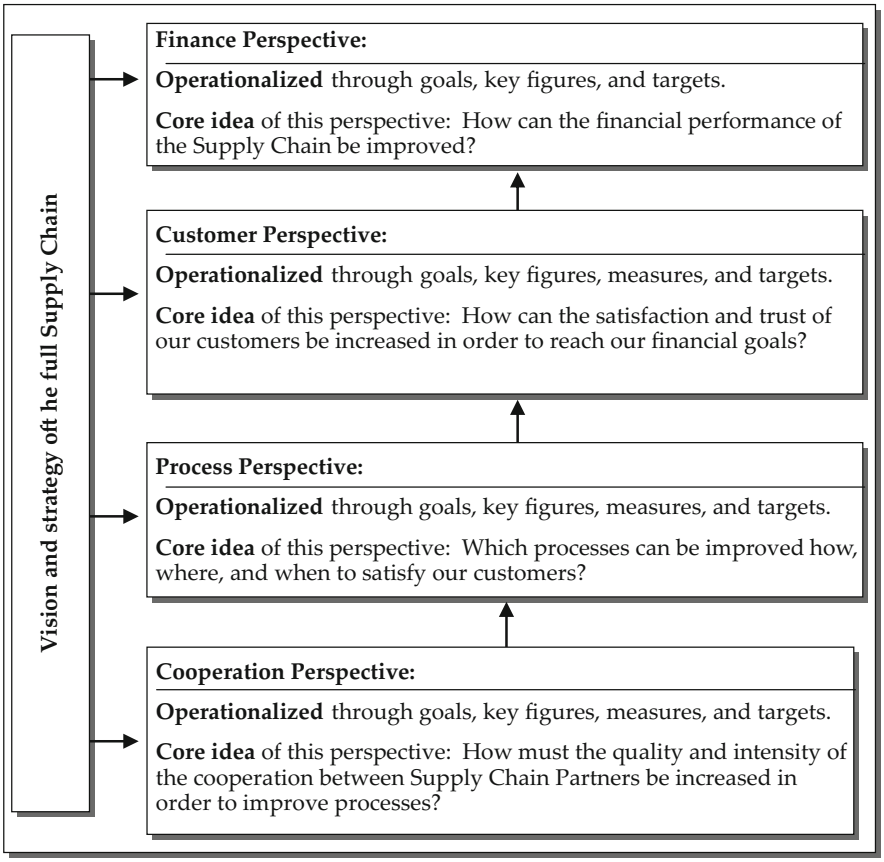

Fig. 11.8 Balanced score card of a supply chain (Cf. Rödler et al. (2003), p. 42)

[13] Cf. Weber and Schäffer (2011), p. 193 et seq.

handled shipment for a defined period without a decrease of shipment volume or an increase in external costs in logistics, this can be explained by a growth rate of the KPI in the HR department *Costs per Staff Hour* due to a higher number of employees on sick leave.

A characteristic of the BSC is its compact and clear layout (which may also be graphical). This is achieved through the aggregation of the individual perspectives to one minimum that is relevant for decision-making (KPI).[14] The BSC of a Supply Chain shown in Fig. 11.8 shows the quality and intensity of the Supply Chain parties' cooperation and that customer satisfaction is directly connected to this.

Case Study 11.2: ROI Scenario Calculation

The *DuPont System of Financial Control* is one of the most well known key figure systems. It is aimed at the company goal profit maximization and works with the Return on Invest (ROI), i.e. the amount of money gained or lost on invested capital, as its top key figure. The ROI is divided into its individual elements and mathematically fully linked.[15] The individual elements are the adjusting screws of management activity. This visualizes the effects of measures on the ROI – also in the field of logistics – and the proportions thereof.

Figure 11.9 shows an initial scenario.

The effects of individual measures in logistics on the ROI will be calculated in the following.

(a) *Decrease in operative logistics costs*
From the initial scenario, it is now assumed that the management is successful in reducing logistic costs by 10 %. The share of logistics costs in other costs is 20 %.

(b) *Reduction of stock*
It is assumed that the management is successful in reducing the stock and the necessary operating capital by 20 %.

(c) *Increase in sales*
The company is able to increase its sales by 10 %. This was only made possible by investing 10 % more into other costs and material costs.

Calculate the changes to the ROI for all three scenarios! Use the procedure from Fig. 11.10.

[14] Cf. Karrer and Petzold (2004), p. 91 et seq.

[15] Cf. Weber and Schäffer (2011), p. 190. und Meyer (2011), p. 141 et seq.

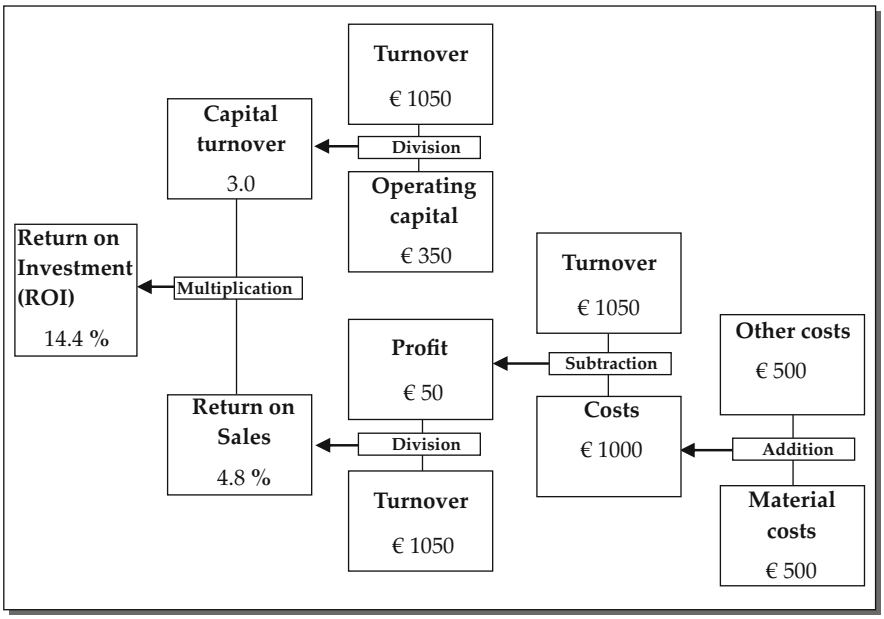

Fig. 11.9 DuPont system of financial control – initial scenario (Cf. Meyer (2011), p. 142)

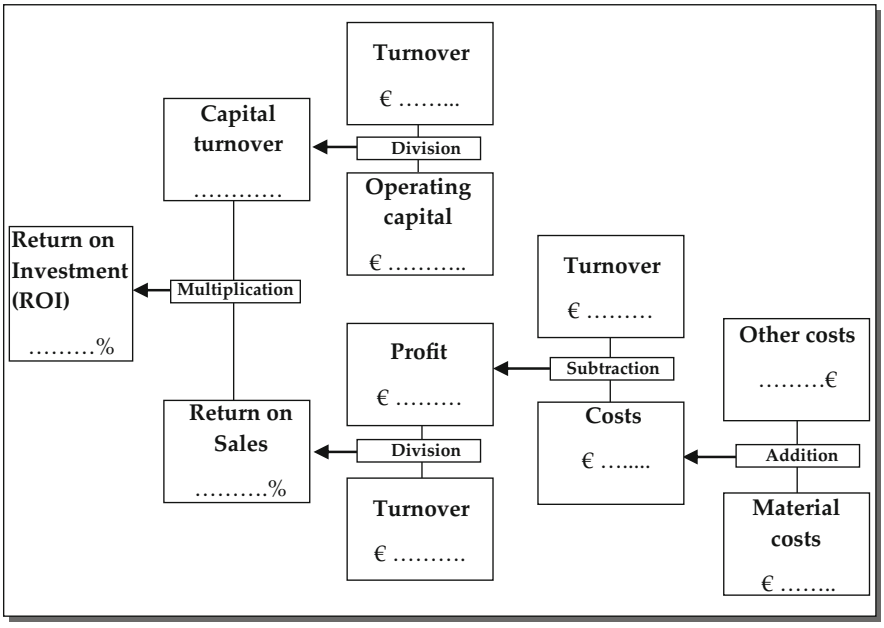

Fig. 11.10 ROI calculation in the DuPont system

11.4 Further Controlling Concepts

11.4.1 Process Cost Accounting

From traditional cost accounting, cost center and cost unit accounting, definition problems arise, especially for the source-based allocation of operating cost. Logistics costs more often appear with a character of overhead costs which usually means flat rate settlement. This leads to an imprecise cost settlement that is not tolerable.

In the fields of production and operating costs for production, this inefficiency in cost and performance accounting has already been analyzed. For improvements in cost allocation, the concept of *Activity-Based Costing* was invented in the USA. Similar to this but different in the process and the range of use, the concept of *Prozesskostenrechnung (process cost accounting)* was developed in Germany. It assesses and analyzes trans-department processes and services in indirect fields.

An orientation towards the process is now more and more common in logistics or for logistical tasks. This makes necessary performance and cost accounting that is divided into the process steps. Thus, process cost accounting becomes an instrument especially suitable for Controlling.

Prior to this, the *process analysis* takes place. Existing logistics processes are divided into main processes, sub processes and, eventually, activities (see Fig. 11.11).

Resources are necessary for activities to take place; these resources cause costs. The amount of the costs can be seen from the number of elements to be moved. In the example in Fig. 9.11, these are the elements to be counted (parcels, packages,

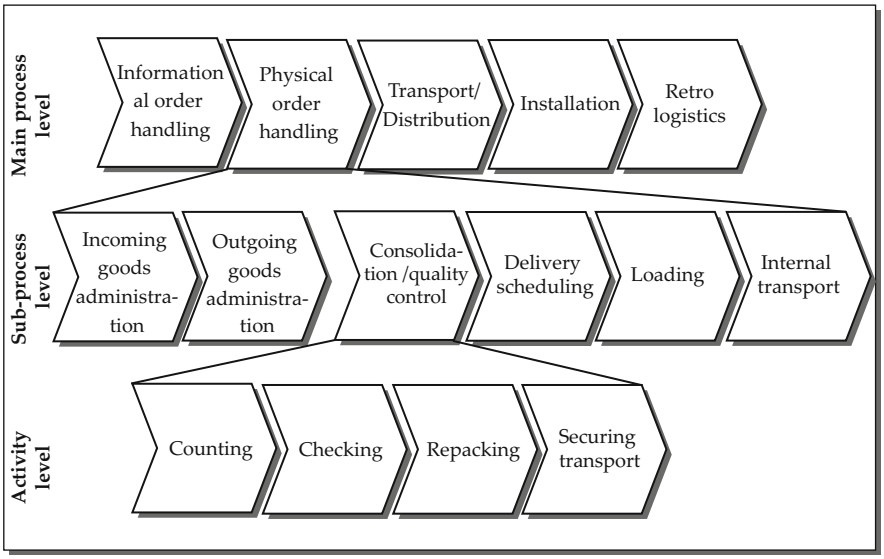

Fig. 11.11 Analysis levels of process cost accounting (Cf. Delfmann and Reihlen (2003), p. 9)

pallets etc.). These elements are called cost drivers. For example, one logistics employee needs 20 s to count the items (elements) for one order. The costs for the employee can be calculated by Euros per second of his or her monthly wage and to Euros per counted item. If such an analysis takes place for every process step that contains different activities, the exact process costs can be calculated.

It is obvious that for a customer order that contains only one package or packing unit of an item, different costs will accumulate for picking, provisioning, and delivery than for an order with a full pallet of the same item. Then again, an order with half a pallet of the same item and five packing units of different items will create different costs. It is widely common to charge the customer a flat rate for every order. This is the point where process cost accounting comes in: it enables detecting the individual sets of costs for calculating the logistics costs for the customer order.

11.4.2 Supply Chain Controlling

As already mentioned, logistics nowadays is not anymore limited to isolated, functional elements such as transport or warehousing but sees itself as a designer of logistics networks in Supply Chain Management. Controlling tasks must be adjusted to this. Tasks like planning, efficiency control, and controlling for processes across value creation steps and company limits are parts of *Supply Chain Controlling*. It focuses on identification, assessment, and optimization of the overall benefit of supply chain processes; subsequently, the profits from these benefits can be allocated to the supply chain actors based on the source or the performance.[16] The instruments for this are the same as the usual Controlling instruments. Realizing Supply Chain Controlling across value creation steps and company borders, however, is not without problems. In everyday work, the provision of the necessary data material by the individual supply chain stakeholders is often difficult. Often, there is a lack of openness and trust between partners; exchanging internal data about performance or, most of all, costs then does barely take place within reasonable time. At this point, relationship management with instruments for increasing trust must be used (see Sect. 3.4.2)

11.5 Costs and Cost Effects; Performance and Performance Effects

The costs and cost effects and the performance and performance effects in warehouse and transport nets show how complex the mapping of logistical cost and performance facts can be (see Chap. 8). In planning warehouse and transport networks, great emphasis is placed on the *tradeoffs* between the network structures

[16] Cf. Neher (2005), p. 29.

and the logistical cost and performance figures because they make possible the assessment of the performance capability and the economic efficiency of the structures.

Cost figures of warehouse networks can be:

- Warehouse costs (staff, rent costs)
- Handling costs (handling, picking, packing)
- Stock costs (interests, obsolescence, storage space costs)
- Transport costs (between warehouse steps, transports to the branches)
- Process costs (controlling, coordination)

The *warehouse cost structure* mostly consists of fixed costs. Variable costs include *handling costs* like incoming goods administration, moving goods in and out of stock, internal transport, picking, and packaging tasks. *Warehouse costs effects* mostly occur when changes to the warehouse structure are made. If the number of warehouses is reduced, there will be higher capacity requirements for the remaining warehouses (space, design, technical equipment). On the other hand, cost reductions can occur through balancing effects in employment of staff as well as through synergies in the management.

Stock costs are a considerable cost driver because of the high capital employed for stock. With stock management largely taking place based on prognosis about potential demand, and replenishment times subject to fluctuations, the risk for incorrect or excess stock increases; it is a considerable *stock cost effect*. The danger of failures (Out of Stock) necessitates maintaining safety stocks, which, in turn, leads to higher stock costs.

Transport costs occur in the form of freight costs for deliveries to production plants, warehouses, or branches. The *transport effects* are mainly influenced by the transport volume structure and the transport cost structure. The transport volume structure depends on how widely vehicle utilization for warehouse deliveries can be realized by bundling. All components of transport cost rates based on distance and volume influence the transport cost structure. If the number of warehouses is increased, there is a tendency for transport costs to warehouses to increase. This effect grows with the elasticity of the transport rate regarding the quantity because lower delivery quantities per warehouse have a stronger effect on the transport costs. On the other hand, delivery costs to branches decrease with a growing number of warehouses for transport costs with decreasing volume because the number of expensive transport distances decreases.

As shown in the paragraphs on stock, warehouse, and warehouse supply costs, *central warehouse network structures* have numerous cost advantages. The necessary capacity for the same handling volume is higher in a full system with a decentralized structure than with a centralized structure. A growing number of warehouses, in turn, leads to higher fixed costs. However, it must be noted that the overall costs are considerably influenced by individual cost categories. Furthermore, individual values are difficult to quantify because of the general difficulties in collection, definition, and allocation of logistics costs. Figure 11.12 summarizes the tendencies of cost effects of warehouse and network structures.

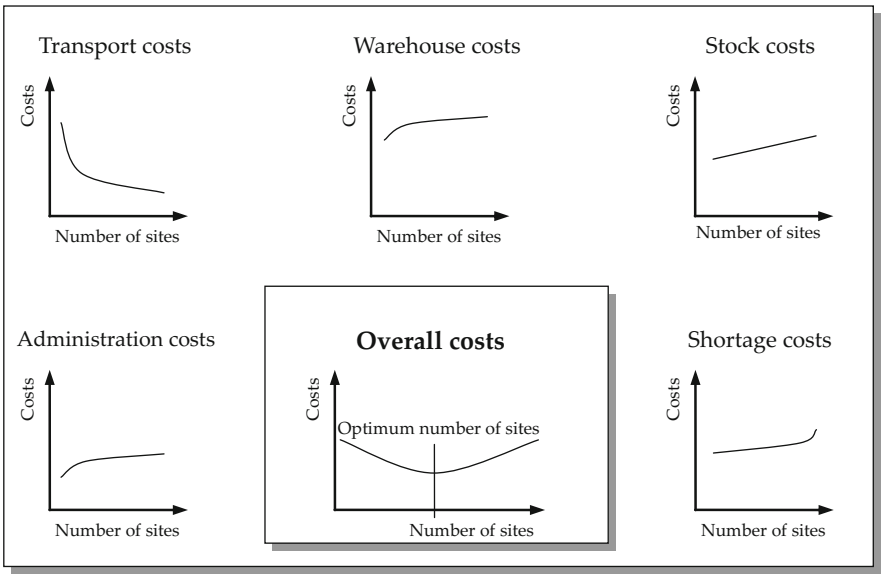

Fig. 11.12 Cost effects of warehouse and network structures (Cf. Pfohl (2010), p. 61)

Mapping *performance effects* is equally difficult. Bundling effects through centralization are contrasted with longer delivery times resulting from growing transport distances to the branches. Additionally, the fluctuation in transport reliability grows with larger distances, which makes necessary higher safety stocks.

Logistics controlling must support these – and more – interconnections of logistical decisions.

Review Questions

1. Which functions must Logistics Controlling include?
2. What does a Balanced Score Card show? Outline a BSC for a logistics service provider.
3. Why is process cost accounting a suitable instrument for logistics?
4. What are cost drivers? Name cost drivers in logistics.
5. What should be components of Performance Management for distribution logistics?
6. Name three central KPIs for purchasing logistics.
7. Connect Supply Chain Controlling to Supply Chain Management. What is the benefit for Supply Chain Management?
8. Outline productivity and quality key figures in logistics.
9. Name key figures for stock management.
10. Which logistics approaches can a company use to improve its ROI?

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