



## STRUCTURE OF CORPORATE LOGISTIC COSTS

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### **Abstract:**

*The article deals with the structure of corporate logistic costs. Logistic costs include a group of costs, which react the same way on any changes in values of certain affecting quantities. Logistic costs further include items, which, when calculating production costs, remain hidden, i.e. not taken into consideration. The goal of each logistic activity is to optimise logistic outputs using logistic components, logistic services and logistic costs.*

*A substantial step in the process of logistic cost monitoring and registering is to define, which costs of corporate processes will be included in logistic costs and to specify the point of their contact with the rest of the units (procurement, production, sales etc.). Once the considered processes are specified it is necessary to select suitable parameters to express logistic outputs.*

**Key words:** *logistic, logistic costs, structure, corporate*

## 1 INTRODUCTION

Under the term “structure of logistic costs” percentage of individual cost items over the total costs is understood. The structure shows the dependence of particular cost elements on production volume. Changes in the cost structure express continuous changes in economics, technology, and organisation of production. Therefore, the cost structure is an important indicator of corporate work analysis. It is important from the perspective of cost planning, especially when planning cost reduction and it is also critical for the specification of the ways costs are reduced.

The structure of logistic costs is determined by different factors, of which one group arises from objective conditions and other group from the character of corporate work [5].

## 2 LOGISTIC COSTS

### 2.1 Characterization of logistics costs

Logistic costs include a group of costs, which react the same way on any changes in values of certain affecting quantities. Logistic costs further include items, which, when calculating production costs, remain hidden, i.e. not taken into consideration.

The goal of each logistic activity is to optimise logistic outputs using logistic components, logistic services and logistic costs.

A substantial step in the process of logistic cost monitoring and registering is to define, which costs of corporate processes will be included in logistic costs and to specify the point of their contact with the rest of the units (procurement, production, sales etc.). Once the considered processes are specified it is necessary to select suitable parameters to express logistic outputs. When proposing and registering logistic costs and outputs it is necessary to carefully consider specific conditions of the enterprise given as the scope of included processes has a strong influence on the amount of reported logistic costs and their percentage over the total corporate costs.

Within a centre, these are logistic outputs, which need to be used in order to execute logistic activities. Logistic costs interconnect corporate economy and logistics.

*The reason for logistic cost monitoring:* [1]

- Percentage of logistic costs increases;
- Monitoring the efficiency of logistic processes;

*Procedure for the proposal of logistic cost and output registration:*

- Logistic process specification;
- Logistic cost classification;
- Determination of appropriate indicators;

*Benefits of cost and output monitoring:*

- Making the items hidden in overhead costs visible;
- Possibility to manage logistic outputs;
- Basis for inter-company accounting of logistic outputs;

*Characteristics of logistic process definition:*

- Material flow analysis (supplying, production, distribution);
- Analysis of a corporate information year (customer requirements, supply, information systems);
- Monitoring all corresponding costs even if these belong to different corporate units;
- Appropriate performance-related parameters. [1]

### 2.2 Importance of corporate logistic costs

In developed markets, where it is generally difficult to increase the volume of sales and where the profitability of enterprises shows a long-term declining trend due to increasing costs and pressure from the competition, it is necessary to constantly looking for ways to improve the productivity. The most important way of how to improve the profitability lies in cost management and reduction [8].

The percentage of logistic costs over the total corporate cost shows a growing trend, which expresses a crucial importance of logistics for the entire economic situation of enterprises. Enterprises should not focus on individual isolated logistic activities. Instead, they should try to reduce their total costs. Cost reduction in one area can lead to the increase in other costs. The high-quality management of logistic roles represents a significant potential for the

achievement of savings in relation to costs, which has an impact on total corporate productivity. To use the potential of logistic management to the fullest is, however, not possible due to the lack of adequate cost-related information [5].

The main insufficiency of a non-integrated approach to the logistic cost analysis is the fact that the efforts related to certain cost reduction as part of the logistic role might not be optimal from the system perspective, which can lead to the increase in total costs. If the management wants to minimise total costs they need to understand the effects of mutual relations of costs within the distribution role and the way individual cost factors influence each other.

The increase in profit can only be achieved if the reduction of costs per single logistic activity exceeds the increase in costs in other task-related areas of logistics. The importance of data preciseness increases with the increase in logistic costs as management finds it difficult to use the full potential of the analysis of logistic cost relations if relevant cost data about individual task-related areas and their mutual influence is not available [1].

**Accounting system must provide information to answer many different questions:**

- *How do logistic costs influence the profit of an enterprise generated by individual segments?*
- *What costs are connected with the provision of high-level customer service?*
- *What is the optimum stock level?*
- *What combination of means of transport should be used?*
- *What should be the frequency of production line rebuilding?*
- *Which alternatives of goods packaging should be used?*
- *Into what extent should the order handling system be automated?*
- *Which costs and earnings change upon the introduction of logistic changes?*

The first step concerning the proposal of logistic cost and performance system must be to define logistic costs i.e. to differentiate them from other costs occurring in an enterprise. It is necessary to specify the costs of which corporate processes will be included in logistic costs and to define the points of contact with other divisions (mainly with procurement, production and sales). It is also inevitable to decide, whether transport and storage costs should be monitored for all provided corporate logistic outputs or only for certain groups of objects (e.g. material, semi-finished products, finished products). Logistic costs are related to individual logistic activities.

According to **Lambert** (Douglas M. Lambert, James r. Stock, Lisa M. Ellram: *Logistics*), logistic costs incur due to activities supporting logistic process or are generated by such activities. The main categories of logistic costs are costs related to customer service, transportation costs, storage costs, order handling and informatics-related costs and stock maintenance costs [4].

According to **Unčovský** (Prof. Ing. Ladislav Unčovský, DrSc.: *Theory and Methods of Logistics*), logistic costs represent service costs, which are directly proportional to service rate. They are either classified as fixed or variable. Variable logistic costs are usually progressive.

The percentage of logistic costs over total corporate costs increases with the increasing labour division. This percentage ranges from 10 – 30 % and its value is different for each enterprise. Information on logistic costs and outputs is important for strategic decisions related to corporate logistic concepts and for strategic and operative decisions related to selected corporate logistic concepts (used as the basis for and for the inspection of logistic decisions and for the calculation of product logistic costs percentage) [5].

### 2.3 Hierarchy of Logistic Decisions Based on Logistic Costs

1. Decisions coordinated by all basic functions and logistics (approval of a program in the field of procurement, production and sales, approval of sales and procurement potentials, planning corporate layout solution).
2. Decisions coordinated between one fundamental basic role and logistics, namely between
  - Logistics and sales;
  - Logistics and production;
  - Logistics and procurement;
3. Decisions coordinated inside the logistics;
4. Decisions concerning partial logistic processes;
  - Transportation-related decisions;
  - Storage-related decisions[5];

The specification of financial benefits arising from individual products should be based on how total earnings, costs and from their ratio arising profitability change when an enterprise stops producing or distributing the product in question. Any other costs or earnings that are not influenced by the decision concerning change introduction are seen as minor from the given problem perspective.

The main reason for the improvement of the availability of logistic cost information is the need of continuous inspection and monitoring of logistic performance. Without precise cost information it is not possible to carry out any performance analysis. If the enterprise does not have enough timely information, it is very difficult for it to manage its logistic activities. The higher the logistic costs the more important it is to have costs related to individual logistic items monitored by the corporate management. It is necessary to know, how changes in costs per individual logistic items influence total costs and corporate profit. The failure of the management to measure and manage logistic costs leads to the loss of business opportunities and to costly mistakes. By the increase in the availability of logistic cost information the management will get better initial knowledge for the execution of strategic and operative decisions [5].

If the management are to make qualified, information-grounded decisions, they have to be able to select from alternatives such as using other public carriers or extending corporate car fleet, increasing the number of deliveries or increasing stock level, extending or consolidating regional warehouses or changing the level of order-handling process and information system automation. These decisions require exact knowledge regarding the state of the existing segments and the extent, into which the considered alternative will be reflected in the corporate total earning and cost change.

Logistic costs are also important for productivity measurement. Productivity indicators are of the following form:

$$Productivity = \frac{Performance\ (output)\ measured}{Input\ measured} \quad (1)$$

### 3 CLASSIFICATION AND BREAK-DOWN OF LOGISTIC COSTS

The classification of costs is used to evaluate individual cost items and corporate output costs and to find potential space for their reduction. It is also important for cost planning and recording [14].

**There are two basic categories of logistic costs:**

- **Fixed;**
- **Variable;**

**The variable or performance-based logistic costs** are caused by the performance of logistic outputs, for which certain production factors are used (fuels, power and utilities, preservatives). Variable logistic costs are further broken down based on, for example, volume being transported, transportation distance, storage period etc.

**The fixed costs or stand-by costs** (availability) occur due to the use of logistic capacities. Their amount does not directly change with the number of provided logistic outputs. They are caused by the preparation and maintenance of capacities in readiness (e.g. workers, means of transport and handling, storage space etc.) [5].

**Fixed costs are further classified as follows:**

- Based on their time availability;
- Based on their dependence on performance;

According to *Schulte* it is possible to divide logistic costs into around five cost blocks [13]:

- **Management and system costs** include costs related to the establishment, planning and inspection of material flows and costs concerning partial functions of production program planning, disposition activities, production management etc.
- **Inventory costs** occur due to the maintenance of stock, in which capital costs are tied up for funding stock, different types of insurance, deterioration and losses.
- **Storage costs** consist of a fixed part designed to maintain storage capacities in readiness and a part of variable costs related to product receiving and issuing processes.
- **Transportation costs** relate to inter-company and external transportation.
- **Handling costs** include all the packaging and handling operation costs and commission-related costs.

*Lambert* breaks logistic costs based on key logistic activities as follows [4]:

**1. Place/level of customer service**

- Customer service;
- Service support and spare parts;
- Returned goods handling;

**2. Costs of stock maintenance**

- Stock level management;
- Packaging;
- Feedback;

**3. Transportation costs**

- Transportation and transfer;

**4. Quantitative costs**

- Material handling;
- Procurement/purchase.

**5. Storage costs**

- Storage,
- Selection of production and warehouse location;

**6. Order handling and informatics-related costs**

- Order handling,
- Logistic communication;
- Sales forecast/planning;

Another possible classification of logistic costs is their breaking down into individual cost types specified in the work by Ballou, R.H.: *Basic Business Logistics*, Prentice Hall, Engelwood Cliffs, 1987, with their percentage over total cost stated (Prof. Ing. Ladislav Unčovský, DrSc.: *Teória a metódy logistiky/Theory and methods of Logistics*).

1. Overhead (administrative) costs – 2.4 %
2. Transportation costs – 6.4 %
3. Storage costs – 3.8 %
4. Storage maintenance costs – 3.7 %
5. Takeover and dispatch costs – less than 1 %
6. Package costs – 4.3 %
7. Order handling costs – 1.2 %

Total logistic costs represent 21.38 % of the total costs. This percentage varies from one sector to another.

Based on other criteria, logistic costs can be put in the following classes[5,8]:

1. Cost for logistic system establishment and management;
  - Costs concerning the analysis, design and implementation of the system;
  - Cost of material flow planning and inspection;
  - Disposition activities;
  - Operative control;
2. Material receipt costs
  - Payroll costs;
  - Fuel expenses;
  - Energy costs/expenses;
  - Depreciations;
  - Repair and maintenance costs,
  - Interests.
3. Inventory costs – which occur due to:
  - the need to maintain warehouse stock;
  - capital funds being tied up in stock;
  - insurance;
  - material deterioration and loss;
4. Storage costs
  - Cost concerning storage space maintenance;
  - Power and utilities;
  - Equipment insurance and depreciations;
  - Crops;
  - Payroll costs;
5. Transportation costs
  - Costs related to inter-company and external means of transport;
  - Percentage of costs included in material price, which is paid to the supplier for its transportation services;
  - Payroll costs,
  - Fuels,
  - Depreciations, interests, maintenance and repairs of means of transport;
6. Handling costs
  - All handling operations and commission-based activities;
  - Wages and salaries;

- Fuels;
  - Depreciations;
  - Packaging material;
  - Maintenance and repairs;
7. Distribution costs;
- Wages and salaries;
  - Depreciations;
  - Interests;
  - Fuels;
  - Power;
  - Insurance;
  - Dispatch costs; [5]

Based on previously mentioned classifications corporate logistic costs are broken down into four basic classes[8]:

1. Management costs
  - Planning;
  - Forecasting;
  - Information system,
  - Flow control,
  - Production set-up.
2. Purchase and storage costs
  - Ordering;
  - Receiving warehouses;
  - Transportation;
  - Inventory management;
3. Costs related to sales;
  - Order handling;
  - Output warehouses;
  - Packaging management;
  - Customer service,
  - Complaints;
  - Promoting activities;
  - Transportation;
4. Intra-company costs
  - Maintenance;
  - Repairs;
  - Power;
  - Waste management;
  - Handling;
  - Insurance;
  - Wages and salaries/payrolls;

When evaluating the efficiency of corporate activities, especially those related to production, production costs are often used as a criterion. Production costs calculated with the use of current accounting calculation methods do not provide precise actual costs. These are often referred to as logistic costs or total costs. Apart from low production costs and high-quality required it is nowadays equally important to launch products as soon as possible. If the

designing unit manages to design a product that is easy to produce or to assemble with the minimum number of parts and steps of production procedure it will substantially reduce not only the product implementation period but also all types of products related to its production[5,8].

#### 4 BASIC CLASSES OF LOGISTIC COSTS

Key classes of logistic costs (tab.1) include [5]:

**Variable costs VC lg.** also known as performance-based logistic costs; these are caused by the performance of logistic outputs, for which certain production factors are used (fuels, power and utilities, preservatives);

**Fixed costs FC lg.** also known as stand-by (availability) logistic costs; these occur due to the use of logistic capacities. Their amount does not change directly with the number of provided logistic outputs. They are caused by the preparation and maintenance of capacities in readiness (e.g. workers, means of transport and handling, storage spaces etc.). [5];

*Tab. 1 Basic Classes of Logistic Costs [5]*

Key classes of logistic costs	
Cost class	Specification and break-down
<b>VC lg. (variable logistic costs)</b> <i>(Performance-based logistic costs)</i>	<ul style="list-style-type: none"> <li>- Dependence on transportation distance;</li> <li>- Preparation period;</li> <li>- Volume to transport;</li> <li>- Stock level;</li> <li>- Storage period etc.</li> </ul>
<b>FC lg. (fixed logistic costs)</b> <i>(Stand-by/availability logistic costs)</i>	<ul style="list-style-type: none"> <li>- Time availability (in what time can the capacity of the given type be enlarged);</li> <li>- Dependence on performance (absolute fixed costs or costs promptly changing depending on production volumes);</li> </ul>

In logistics, we often deal with the need to differentiate between fixed and variable cost items not only when deciding upon the total production volume but also when, for instance, deciding on the degree of vehicle capacity utilisation, size of production and purchase batches etc.

For example, there are quite a lot of fixed items amongst partial cost items in relation to stock level maintenance. While, for instance, the interest and insurance amount has to be looked at as variable costs from stock level perspective, the storage space costs and costs of handling equipment behave, into a certain increase in stock level limits, as fixed costs.

And vice versa – when stock level in warehouses goes down, the costs stay the same up to the moment, when warehouses and equipment are sold or used for some other purpose. It is therefore necessary not to take, for example, the model of batch size optimisation with a pinch of salt. The model understands all stock level maintenance costs as variable and results in an unacceptable simplification.

Costs of one machine setting when changing over to a different product type does not depend on the size of the above batches and, as such, represent fixed costs. The total annual costs of the same machine setting depend on the number of batches (i.e. they are variable considering the number of batches). This also applies to the relation between order issuing costs



and the volume being ordered. The fixed part of transportation costs are road use costs, train sequencing costs etc. The variable part of such costs is the costs dependent on transportation distance.

A category of logistic costs covers a group of costs, which react the same way on any changes in values of certain affecting quantities. The knowledge of a detailed cost structure makes it possible to analyse the impact that changes of different factors have on logistic costs and outputs. It is purposeful to group logistic costs into categories (tab.2) so as to have a group of separate monitored cost types of reasonable size [8].

**Tab. 2 A category of logistic costs [8]**

Logistic costs			
Order No.	Logistic processes	Cost type	Cost specification
1.	<b>Process of logistic system establishment and management</b>	Costs of corporate logistic system establishment and management	<ul style="list-style-type: none"> <li>- Costs concerning logistic system analysis, design and implementation;</li> <li>- Costs concerning material flow planning and inspection;</li> <li>- Costs concerning disposition activities;</li> <li>- Operative management costs etc.;</li> </ul>
2.	<b>Corporate information system – information logistics</b>	Costs concerning the establishment and management of corporate logistic information system	<ul style="list-style-type: none"> <li>- Payroll costs;</li> <li>- Depreciations;</li> <li>- Repair and maintenance costs;</li> <li>- Energy costs;</li> <li>- Insurance costs etc.;</li> </ul>
3.	<b>Procurement logistics – supplying</b>	Material receipt costs	<ul style="list-style-type: none"> <li>- Payroll costs,</li> <li>- Depreciations;</li> <li>- Debit interests;</li> <li>- Repair and maintenance costs,</li> <li>- Insurance premiums;</li> <li>- Inspection/audit costs;</li> <li>- Quality management costs related to supplies, initial quality control;</li> <li>- Invoicing etc.;</li> </ul>
4.	<b>Warehouse management</b>	Storage costs	<ul style="list-style-type: none"> <li>- Costs concerning interests of the capital tied up in inventories;</li> <li>- Depreciations of warehouse equipment;</li> <li>- Energy and heating costs;</li> <li>- Building insurance costs;</li> <li>- Rental fees;</li> <li>- Shortages and damages related to inventories etc.;</li> </ul>
5.	<b>Corporate and external transportation</b>	Inter-company transportation and handling costs Costs of transportation provision including activities related to carrier or forwarder (or operator) selection, type of repairs, means of transport, transportation method, transport route etc.	<ul style="list-style-type: none"> <li>- Payroll costs,</li> <li>- Fuel expenses;</li> <li>- Interests,</li> <li>- Depreciations;</li> <li>- Repair and maintenance costs etc.;</li> </ul>
6.	<b>Packaging management – commission-based activities</b>	Costs related to commission-based activities, product packaging and package production, repair and storage	<ul style="list-style-type: none"> <li>- Payroll costs;</li> <li>- Packaging costs;</li> <li>- Packaging material costs etc.;</li> </ul>
7.	<b>Distribution – sales - distribution logistics</b>	Distribution costs	<ul style="list-style-type: none"> <li>- Payroll costs;</li> <li>- Fuel expenses;</li> <li>- Depreciations;</li> <li>- Repair and maintenance costs;</li> <li>- Energy costs;</li> </ul>

8.			- Insurance costs etc.;
	<b>Waste management</b>	Costs concerning waste collection, separation and removal and its rational usage or disposal	- Payroll costs; - Fuel expenses; - Depreciations; - Repair and maintenance costs; - Energy costs; - Insurance costs etc.;
9.	<b>Order logistics</b>	Costs concerning order registration and technological, economic and capacity-related order evaluation	- Payroll costs; - Depreciations; - Energy costs;
10.	<b>Customer service</b>	Costs concerning activities focused on customer satisfaction and marketing activities	- Payroll costs; - Depreciations; - Energy cost; - Marketing activity costs;
11.	<b>Production operators</b> - other service activities	Production operation costs	- Payroll costs; - Fuel expenses; - Depreciations; - Repair and maintenance costs; - Energy costs; - Insurance costs etc.;
12.	<b>Energy management</b>	Energy management costs	- Payroll costs; - Fuel expenses; - Depreciations; - Repair and maintenance costs; - Energy costs (total energy consumption); - Insurance costs etc.;
13.	<b>Repair and maintenance activities</b>	Cost concerning the provision of repair and maintenance activities	- Payroll costs; - Fuel expenses; - Depreciations; - Repair and maintenance costs; - Energy costs; - Insurance costs etc.;

## 5 CONCLUSIONS

Logistics of manufacturing enterprises is an important element of corporate financial flows. Its specific feature is its distribution during performance of almost all corporate activities. From raw material purchasing, through planning up to the transport of finished products it substantially influences cost items of individual corporate segments [5].

Another significant specific feature is the interrelation and interconnection of parts of logistics in individual segments and their ability to influence each other, which either occurs in a controlled or uncontrolled manner, in an increase in or reduction of costs related to logistic chains and as the reaction on cost movements in the counter-segment of the logistic chain. [5]

That is why it is important to monitor/track logistics costs as an integrated system and to look at cost management as a whole. It is also very important to analyse logistics costs in detail as per individual segments and to monitor their interrelations.

A chart presenting corporate logistic costs and their interrelations and consequences is an indicator showing interconnections of integration of individual corporate activities [5].

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