

STRUCTURE AND POSSIBILITIES OF COMMERCIAL LOGISTIC COSTS REDUCTION

BUSA Michal¹, KAZIMIROVA Ivana², PUSKAS Eduard³, FARKAS Csaba⁴

¹Technical university of Košice, Faculty of Mining, Ecology, Process Control and Geotechnologies, Institute of Logistics, Kosice, Slovakia, EU

¹michal.busa@tuke.sk, ²ivana.kazimirova@virginaustralia.com, ³puskas.eduard@gmail.com, ⁴csbfrks92@gmail.com

Abstract

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.

Keywords: Structure, logistic activity, logistic costs, reduction, corporate

1. INTRODUCTION

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 [1].

2. STRUCTURE AND POSSIBILITIES OF COST REDUCTION IN THE FIELD OF COMMERCIAL LOGISTICS

2.1. Costs of Procurement Logistics

The logistics of procurement forms an integral part of corporate logistics. Its role starts with the finding of particular needs related to manufacturing processes, continues through market research and ends with supplier selection, which, in turn, results in the contracting procedure and purchase order signing. The role of procurement logistics further continues with the monitoring of contract fulfilment up to the moment of goods handover.

An effective program of purchase-related cost reduction must be supported by corporate top management. It further has to have clearly defined goals, which can be measured and results of which can be subsequently evaluated.

This kind of program related to purchase cost reduction should cover the following methods [2]:

- Development of a supplier system (a systematic corporate effort to establish and maintain a system of suppliers and improve different supplier qualities, which is necessary so that the purchasing organisation can fulfil ever more demanding market requirements);
- Taking advantage of the competition existing amongst suppliers (this creates a possibility to take advantage of competitive relations in the supplier market for the purpose of best supplier selection - due to the existing competition, the supplier is forced to provide its customer with various special services e.g. increased quality, reduced prices etc.);
- Requirements relate to supplier's cost reduction (corporate effort to be aware of supplier's costs and to require their reduction - the more reduced the supplier's costs, the lower the price of goods and service provided);
- Timely involvement of suppliers in the development of new product designs and in changes of existing product designs (introduction of simultaneous engineering - close cooperation of technical employees of suppliers with customers regarding product development and improvement);
- Material substitution (it is a substitution of one type of material by another with the same or similar qualities, which is of a lower price or is promptly available etc.);
- Standardisation (purchasing of standard goods and products makes the process of purchasing easier and reduces transportation, handling, storage and production costs);
- Make-or-buy analysis (this method can also be used for purchasing purposes - its makes the enterprise decide whether products and services will be provided by its own sources or through external deliveries);
- Waste reduction (effort to purchase material that would create the least waste; this will reduce waste disposal costs);
- Changes in processes and technical requirements (improvement of processes and product technical requirements can make purchasing easier and can reduce purchasing costs);
- Improvement of payment terms and conditions - this means the agreement on payment terms and conditions that are of benefit for the given manufacturing enterprise, e.g. invoice-based payments etc.
- Bulk volume purchases (when purchasing bulk volumes, price discounts can be given to the purchasing enterprise and supplies-related fixed costs can be reduced); [3].

2.2. Costs of the Logistic of Supplying

Inventories represent a first-level cost factor. Their management and optimisation is of ever bigger importance. Perfect recording and accounting related to inventory receipt, take-over, storage and issuing forms a prerequisite for inventory optimisation [2], [4].

Too high stock levels can reduce corporate profitability in two ways:

- 1) Its net profit is reduced by petty expenses related to stock maintenance (insurance, taxes, storage, damage, interests etc.);
- 2) The total assets are increased by the amount tied up in stock; this reduces corporate asset turnover as the enterprise must give up the opportunity to invest in something else;

Methods of stock level reduction [5]:

- Multi-level stock planning (e.g. ABC analysis - breaking purchased material inputs down as per their relative percentage over the total value of materials purchased);
- Analysis of stock replenishment period and delivery periods (this relates to the determination of optimum ordering and delivery times related to material takeover while considering certain backup time);
- Exclusion of low-turnover and obsolete items (these items do not require any detailed planning and the goal of supply management is to gradually exclude such items from detailed planning);
- Package size analysis (the effort to minimise and standardize packages, transportation and handling units);

- Reviewing complaint and goods return procedures (specification of a procedure for solving complaints caused by suppliers or carriers and subsequent return of undesired goods);
- Support of product substitution (this relates to the substitution of materials by other similar materials, which are of the same or even better qualities, are of better availability, cheaper etc.; by their introduction it is possible to reduce inventory costs);
- Introduction of a formalised order system related to stock replenishment and subsequent evaluation of delivery fulfilment as per individual stock items (such system uses the actual data concerning customer demands and is connected to a prognostic system and production planning; it reduces the possibility of erroneous message and unexpected time delay occurrence - safety stock volume reduction);
- Stock summary extension (possibility to share information and stock management on different supply chain levels);
- Re-organising methods used to manage stock so as to improve material flow (e.g. the JIT method - product, part or material delivery in the time when these are needed by enterprise; quick response system QR - improved stock management and increased efficiency thanks to improved stock flow rate);
- Ensuring quality deliveries (the use of TQM approach based on ISO 9000 standards);

The suitability of individual methods varies from one enterprise to another, all that based on a particular needs and possibilities related to stock levels.

2.3. Costs of Sales Logistics

Sales just like supplying on the other side of corporate equation represents one of the most crucial cost factors, which can cause great losses or great gains in the form of revenues. The objective of sales is to meet the demands of domestic as well as foreign markets in the amount, product mix and quality and time required, all that in accordance with the corporate production program.

The sales logistics tries to reduce sales costs, increase the profitability of sold products and to attract orders for production goals fulfilment. This all has a substantial impact on optimisation and the achievement of corporate goodwill [2], [6].

2.4. Distribution Logistics Costs

The distribution logistics represents a group of logistic tasks and measures concerning distribution preparation and performance. It deals with all the activities related to goods flow from finished product warehouses to sales market, gaining information and documents for invoicing included. The management of distribution chains represents a system approach, which is highly interactive and complex and which requires simultaneous review of different relations. The objective of logistics is to have distribution performed at minimum costs and to have very good business service provided (delivery periods, flexibility of deliveries, readiness of deliveries, reliability of deliveries, quality of deliveries), transportation, packaging a storage [7].

When minimising distribution costs logistics applies the following measure [7]:

- Involvement of intermediaries in the distribution process (intermediaries solve the non-conformance concerning the supplied and demanded product mix by sorting and grouping goods - sales and logistics cost reduction);
- Introduction of routine transactions (it is not necessary to introduce special conditions for each of the transactions - improved efficiency of logistic operations);
- Ensuring high-quality supplier service (reliability and quality of deliveries - this relates to on-time deliveries and deliveries of products without any defects) and flexibility of deliveries (ability to accept special customer requirements);
- Improved quality of communication between customers and the enterprise (it is necessary to propose a good-quality system of communication between the manufacturing facility and customers as such

system can point out different defects and insufficiencies of products and their distribution in a timely manner);

- Selecting an appropriate distribution strategy (based on an analysis of the market, competition, enterprise possibilities; it is necessary to consider customer shopping behaviour and the character of products; it is also necessary to choose the right type of distribution - intensive, selective, exclusive etc.);
- Using hold-up methods (the result of such method are savings as such hold-up moves the differentiation of products closer to the buying moment, i.e. to the moment, when it is possible to forecast the demand more easily and precisely - this reduces costs related to risk and uncertainty) and speculations (the opposite of hold-up methods - the enterprise is part of distribution channels, thus the risk is not transferred and it is intentionally borne by the enterprise; this results in the introduction of large-scale production, placing extensive orders, reduction of situations when products might be out of stock, elimination of the risk and uncertainty);
- Outsourcing (the use of distribution services of other companies - outsourcing represents an important possibility that the company should consider when proposing supply chains and when assessing already existing distribution channels);
- Specifying an optimum type of transportation, means of transport and transportation system (this relates to the minimisation of transportation costs, the effective use of means loading capacity, specification of the shortest transport route, decisions on corporate own and other transport performance, flexibility, promptness, reliability and quality of transportation);
- Using standard packages and package labelling (by introducing standard packages and their labelling distribution will be easier and faster);
- Using centralised storage (possibility of automation and systematic integration, which will ensure the improvement of supply chain efficiency and performance);
- Cash flow improvement;
- Improved cooperation of the distribution unit with the rest of logistic chain partners (purchasing, supplying, production, sales, distribution - synchronisation of cooperation amongst individual corporate logistic units will ensure an optimum functioning of the entire enterprise); [7], [8]

The suitability of these methods application varies from one enterprise to another. In general, the effort is to shorten distribution chains, concentrate distribution capacities into smaller units and reduce the scope of distribution on all the levels [7].

2.5. Structure and Possibilities of Cost Reduction in the field of Production Logistics

Under the term "Production logistics/logistics of production" a set of logistic tasks and measures related to the preparation, provision and implementation of manufacturing process is understood. It contains all the activities related to the material and information flow of raw materials, auxiliary and production materials from warehouses to production. It also covers everything from semi-finished product and purchased product warehouses, individual stages of manufacturing process, all intermediate warehouses included, to finished product warehouses. The role of the production logistics is to ensure continuous production and its synchronisation with other corporate divisions, which has a positive impact on corporate profitability [9].

The production logistics contributes to the solution of several problems and functions on several levels [10]:

- 1) Allocation issues and layout
 - Manufacturing process allocation;
 - Arrangement of machines in manufacturing process;
 - Allocation of single-purpose machines;
 - Layout (workshop arrangement of production);

In connection with the above issues, different methods such as multi-criteria decision-making (certain weight is assigned to key business and production factors and, based on the sum of individual weights, an optimum

location is selected), cost analysis (solving the issue related to the assignment of manufacturing process to several locations) etc. are applied.

2) Tactical planning - forecasting

- Forecasting based on sources;
- Forecasting production of a group of products and sales of such products;
- Calculation of requirements concerning material, raw material, and power and utilities etc.
- Calculation of capacities related to machines, human resources, funds etc.;

In this case, the logistics uses quantitative methods (e.g. statistical methods - historical data analysis and processing, their extrapolation for the forecasted period) or qualitative methods (these are based on subjective information, from which a numerical estimate is prepared - estimates of sales people, group expert opinion market research, Delphi method etc.). It is necessary to consider certain forecasting errors and to be able to calculate them. The goal of forecasting is to specify capacity strategy (based on production capacity and forecasted requirements) and capacity balancing of manufacturing process (adjusting capacities to requirements).

3) Aggregated planning

- Order logistics (interconnection between the production and commercial logistics);
- Defining production tasks;

The role of logistics is to propose and implement an optimum system solving order recording and technical, technological and economic review, capacity planning, internal order accumulation, batching and generation. This at the same time defines production roles.

4) Operative planning

- Production scheduling (production schedule, time schedule);
- Dispatching control (performance of operative planning in the manufacturing process);
- Operative registration and monitoring;

Here, logistics applies various methods: assignment of production operations to certain machines, optimum use of bottlenecks (OPT), Gantt's scheme (forward and backward scheduling), network analysis (methods such as CPM, PERT, MPM, GERT), sequence problem (matching, coupling, Branch and Bound, indirect methods), balancing production lines (reduction of downtimes at individual lines), break-down of products into subgroups (MRP), heuristic methods etc. [11].

This represents an integration of operations into more comprehensive units and reduction of number of contact points. The tendency to make the character of production as similar to order-based production with low stock levels leads, in many cases, to the use of the Just in Time (JIT) method, which optimally synchronizes individual transportation, storage, production and assembly processes in the entire manufacturing process [12].

3. CONCLUSION

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 do 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.

ACKNOWLEDGEMENTS

This work was supported by the Slovak Research and Development Agency under the grants VEGA No. 1/0258/14.

REFERENCES

- [1] MACUROVÁ, P. Ekonomika logistiky, kapitola 14., In Bazala, J. a kol.: Logistika v praxi, Verlag Dashofer, Prague, 2006, ISBN 80-86229-71-8.
- [2] ROSOVÁ, A. Logistické náklady podniku, 2007. In: Acta Montanistica Slovaca. Roč. 12, č. 2 (2007), pp. 121-127. - ISSN 1335-1788.
- [3] BAZALA, J. a kol. Logistika v praxi: Praktická příručka manažéra logistiky, Svazek 3, 2003. stať 14.2., 14.9.
- [4] SANIUK, A., SANIUK, S., CAGANOVA, D. et al. Key performance indicators in assessment of enterprises of metallurgical sector, TANGER Ltd., CZECH REPUBLIC, METAL 2015: 24th international conference on metallurgy and materials, pp. 2070-2075, Published: 2015.
- [5] MALINDŽÁK, D., ŠADEROVÁ, J., VITKO, D., MALINDŽÁKOVÁ, M. - GAZDA, A. The methodology and model for in-process inventories calculation in the conditions of metallurgy production - 2015. In: Metalurgija. Vol. 54, no. 1 (2015), p. 227-230. - ISSN 0543-5846.
- [6] MALINDŽÁKOVÁ, M., STRAKA, M., ROSOVÁ, A., KAŇUCHOVÁ, M., TREBUŇA, P. Modeling the process for incineration of municipal waste - 2015. In: Przemysł chemiczny. Vol. 94, no. 8 (2015), p. 1260-1264. - ISSN 0033-2496.
- [7] ROSOVÁ, A. Sústava ukazovateľov distribučnej logistiky, logistiky dopravy a materiálového toku ako jeden z nástrojov controllingu v logistike podniku 2010. In: Acta Montanistica Slovaca. Roč. 15, mimoriadne č. 1 (2010), pp. 67-72, ISSN 1335-1788.
- [8] STRAKA, M., MALINDŽÁKOVÁ, M., ROSOVÁ, A., TREBUŇA, P. The simulation model of the material flow of municipal waste recovery / Martin Straka, [et al.] - 2016. In: Przemysł Chemiczny. Vol. 95, no. 4 (2016), pp. 773-777. - ISSN 0033-2496
- [9] STRAKA, M., TREBUŇA, P., ROSOVÁ, A., MALINDŽÁKOVÁ, M., MAKYSOVA, H. Simulation of the process for production of plastics films as a way to increase the competitiveness of the company / Martin Straka ... [et al.] - 2016. In: Przemysł chemiczny. Vol. 95, no. 1 (2016), pp. 37-41. - ISSN 0033-2496.
- [10] ŠADEROVÁ, J., KAČMÁRY, P. The simulation model as a tool for the design of number of storage locations in production buffer store / Janka Šaderová, Peter Kačmáry - 2013. In: Acta Montanistica Slovaca. Roč. 18, č. 1 (2013), pp. 33-39. - ISSN 1335-1788.
- [11] TREBUŇA, P., STRAKA, M., ROSOVÁ, A., MALINDŽÁKOVÁ, M. Petri nets as a tool for production streamlining in plastics processing - 2015. In: Przemysł chemiczny. Vol. 94, no. 9 (2015), pp. 1605-1608. - ISSN 0033-2496.
- [12] ŠADEROVA, J., BINDZAR, P. Using a model to approach the process of loading and unloading of mining output at a quarry [Užcie modelu podejścia do procesu załadunku i rozładunku urobku w kamieniołomie] (2014) Gospodarka Surowcami Mineralnymi / Mineral Resources Management, 30 (4), pp. 97-112.