



## **THE LOGISTIC COST ANALYSIS IN AGRIBUSINESS – CASE STUDY OF FOOD SECTOR COMPANY**

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### ***Abstract***

The paper aims to determine the level and diversification of logistic costs in an agribusiness enterprise. Applied were selected indicators of logistic costs assessment on an example of a micro enterprise. The logistic costs breakdown by nature was used for this assessment. Proposed assessment indicators are plain and unambiguous to interpret.

There was stated that in the presented agribusiness enterprise the value of logistic costs is affected mainly by: remuneration costs (they cover 45% of total logistic costs), costs of external services and costs of materials and energy consumption, in which fuel makes up the highest percentage. The calculated indicators inform that the amount of logistic costs is on a satisfactory level, comparing with food sector trends. The proposed approach simplifies logistic cost analysis. It does not require additional records or accountancy and is possible to apply in practice. Limitation of this method is associated with proper evidence and distinguishing the logistic cost in the overall company costs.

**Key words:** logistic cost, agribusiness, food sector, costs by nature

### **INTRODUCTION**

Logistic, understood as the management of activities concerning the movement and storage of commodities, which should enable the product flow from the place of origin to the place of consumption, as well as the management of

product-related information, may be a significant factor of improving the competitiveness and efficiency of agribusiness.

In recent years, the managers of agri-food companies have been more and more often seeking the possibilities and ways to improve the material and information flow. One of the opportunities is reducing the costs involved in these flows.

The problem of logistic costs belongs to the most complex and difficult issues owing to the difficulties connected with a very fuzzy and extended structure, but also with the identification due to strong links with other economic costs at the simultaneously missing formal financial and accounting procedures, which refer to the streams and logistic processes.

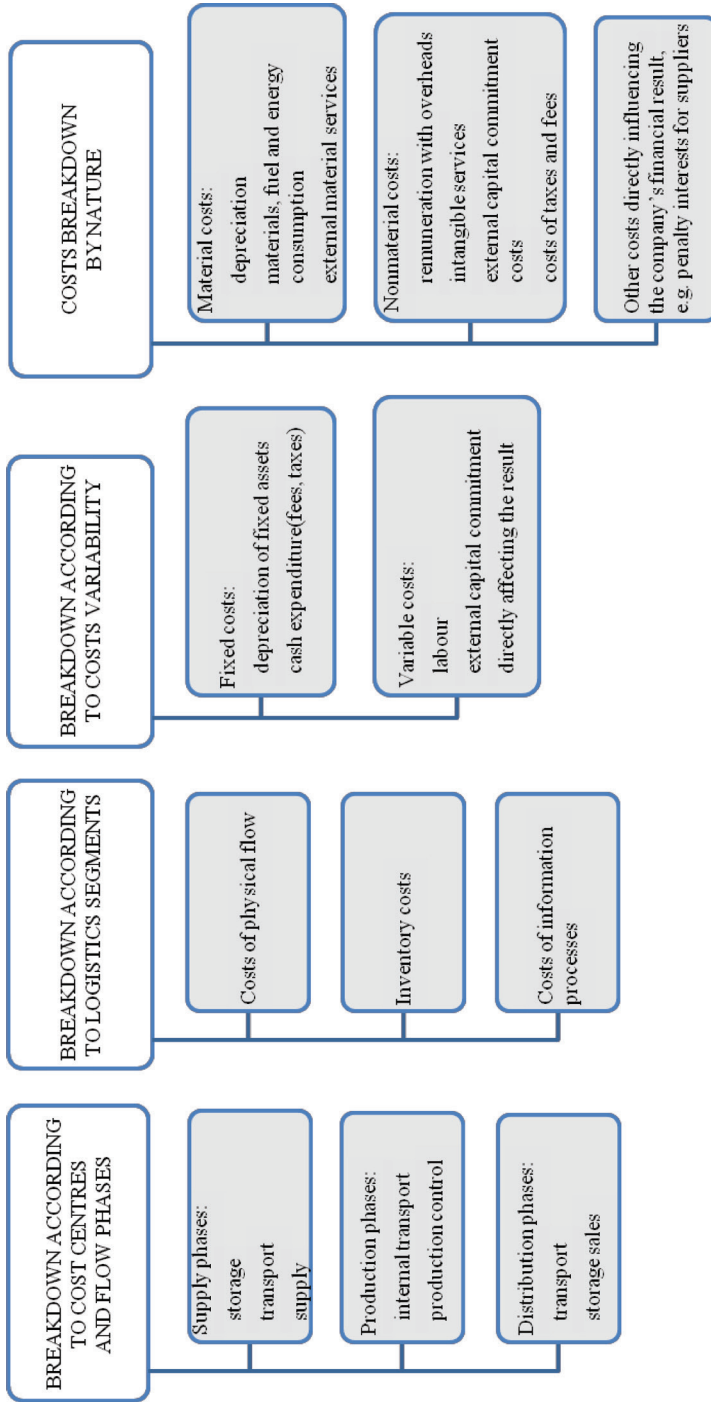
Therefore, the notion of logistic costs has been defined in literature in various ways, mainly in the light of their sources and types.

Logistic costs show a reflection in cash of the use of a given company's property (labour, work tools, means, financial expenditure, maintenance of stocks), among others through planning, execution and control of the non-technological processes of movement in space and time of all material goods between the companies and within a company (Cho, 2014; Ficoń, 2001; Skowronek, 1999). Generally, it may be stated that logistic costs are financial outlay, crucial for performing logistic tasks.

On the other hand, it is commonly stated, that logistic costs are considered as a key category in the management targeting the flow of both material and information streams in each company (Skowronek, Sarjusz-Wolski, 2003, Solakivi *et al.* 2011). They are one of the main criteria of the efficiency assessment of applied logistic technologies and in the hierarchy of importance, they immediately follow the imperative customer servicing standards (Ficoń, 2001). The justification of this statement in the first place comprises (Nowicka-Skowron, 2000):

- high share of logistic costs in total costs (depending on the industry, between 20% to 80% – for transport companies),
- considerable opportunities of reducing logistic costs leading directly to increasing company's profit,
- difficulties with a considerable increase in the turnover under conditions of stabilised demand.

Therefore, precise identification and detailed specification of logistic costs, according to current needs, is crucial. They greatly affect generating the final financial result, which determines the level of company's profitability, but also influence the overall result of company's economic activity. The share of logistic costs in total costs differs depending on the industry, however it is obvious that too high logistic costs to a considerable extent decrease the company's profit, so they should be constantly observed and regulated (Twaróg, 2003).



Source: based on (Skowronek, 1999)

**Figure 1.** Main criteria of logistic costs breakdown in companies

While analysing the logistic costs, managers have an opportunity to learn the weaknesses and strengths of logistic processes in the enterprise. It is particularly important for small and medium-sized agribusiness enterprises, where usually cost analysis, particularly concerning logistic costs is an omitted aspect of management and therefore the area with a considerable potential of improvement and strengthening the competitive position of companies.

One of the basic instruments used to measure the efficiency of logistic systems management are indicators. They present empirically observed and measurable real states, which possibly objectively describe the targets of logistic or the logistic target system. Proper appointment and monitoring of logistic indicators enable early identification of the positive and negative tendencies, but also contributes to logistic processes control (control function).

Due to their complexity, the breakdown of logistic costs should be made properly, according to the following criteria: costs by nature, by logistic segments, by cost centres and flow phases, as well as according to cost variability. There are various approaches to define and classify the logistic costs, presented on the fig.1. The breakdown of costs by nature was assumed for the article purposes, i.e. a typical approach to cost types applied in accounting records.

### **THE AIM AND SCOPE OF THE PAPER**

The paper aims to determine the level and diversification of logistic costs in an agribusiness enterprise. The purpose of the paper is also to verify effectiveness and easily of the logistic costs indication using its breakdown by nature (cost by type).

Applied were selected indicators of logistic costs assessment on an example of a chosen micro enterprise from bakery industry. The logistic costs breakdown by nature was used for the assessment and the individual components were identified on the basis of the profit and loss account of the discussed enterprise, i.e.:

- depreciation of fixed assets involved in the realisation of logistic costs, means of transport, storage facilities, transport appliances, etc.
- materials and energy consumption,
- costs of remuneration and benefits for employees responsible for performing logistic tasks,
- costs of services provided by external business entities (costs of transport, loading works, repairs, etc.)
- taxes and fees (e.g. property taxes or means of transport taxes),
- other costs by nature.

The cost breakdown by nature was applied because it is the breakdown that is usually used for cost analysis in accounting. As an example accounting data

form year 2014 (12 months) were used. To indicate trend of logistic cost in the company, value from 2014 was compared with the costs in period 2010-2013.

### MATERIAL AND METHOD

Analysed company offers eight main groups of products to the clients in southern Poland and Slovakia. They are mainly retailers (73%), then pastries producers (13%) and bakery networks (10%). Company produces: shortbreads (cookies), waffles, biscuits, chocolate products, jellybeans, candies, and French pastries. The distribution processes are carried out using own means of transport (as prevailing activity). Company's financial data were selected from accounting documents supported with the interviews with company employees. It was necessary to indicate which cost is connected with logistic processes.

The evidence of total logistic costs are presenting in the Table 1.

**Table 1.** Evidence of cost types in company

	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII
Depreciation	3 547	3 512	3 512	3 016	3 016	4 506	4 671	3 016	4 506	3 584	3 731	6 826
Materials and energy consumption	4 361	2 336	5 029	4 279	4 229	3 631	4 486	2 665	5 423	5 015	5 604	9 275
External services	14 242	10 927	13 281	12 751	16 481	12 762	15 332	16 459	17 912	21 967	28 855	21 341
Taxes and fees	0	0	500	3	84	0	0	0	915	0	650	30
Remunerations	24 889	25 704	22 115	18 761	20 851	20 556	27 130	28 146	30 466	30 015	28 830	28 377
Social security contributions	4 485	3 822	4 637	3 128	3 806	3 473	3 462	1 014	3 802	4 540	3 683	3 516
Other costs	4 871	500	153	1 352	245	376	11 025	106	911	355	60	7 379

The assessment of logistic costs was conducted using company's costs breakdown by nature. Proposed approach should simplify the logistic costs analysis. It does not require from firm any additional records, but necessary is to indicate (on accounting documents) which cost position belongs to logistic cost. In addition, it generates the main problems during analysis. The total logistic costs

value was established as sum of all components according to the Eq.(1).

$$C_L = C_d + C_{me} + C_{tf} + C_{es} + C_{sc} + C_r + C_o \text{ (PLN)} \quad (1)$$

where:

- $C_d$  – depreciation costs (PLN)
- $C_{me}$  – costs of materials and energy consumption (PLN)
- $C_{tf}$  – taxes and fees (PLN)
- $C_{es}$  – costs of external services (PLN)
- $C_{sc}$  – social security contributions and other benefits (PLN)
- $C_r$  – remuneration costs (PLN)
- $C_o$  – other costs (PLN)

Indicators for individual categories of logistic costs were selected and determined as share in total turnover (Eq.2) and in total costs (Eq.3):

$$S_{TC_n} = \frac{C_n}{T} 100 \text{ (\%)} \quad (2)$$

where:

- $S_{TC_n}$  – the share of  $n$  costs category (%)
- $C_n$  – cost category (PLN) [ $n = C_L, C_d, C_{me}, C_{tf}, C_{es}, C_{sc}, C_r, C_o$ ]
- $T$  – turnover (PLN)

$$S_{C_L} = \frac{C_L}{C_T} 100 \text{ (\%)} \quad (3)$$

where:

- $S_{C_L}$  – the share of total logistic costs in the total costs (%)
- $C_L$  – logistic costs (PLN)
- $C_T$  – total costs (PLN)

The total costs were determined according to the Eq.(4):

$$C_T = C_{OA} + C_{OP} + C_F \text{ (PLN)} \quad (4)$$

where:

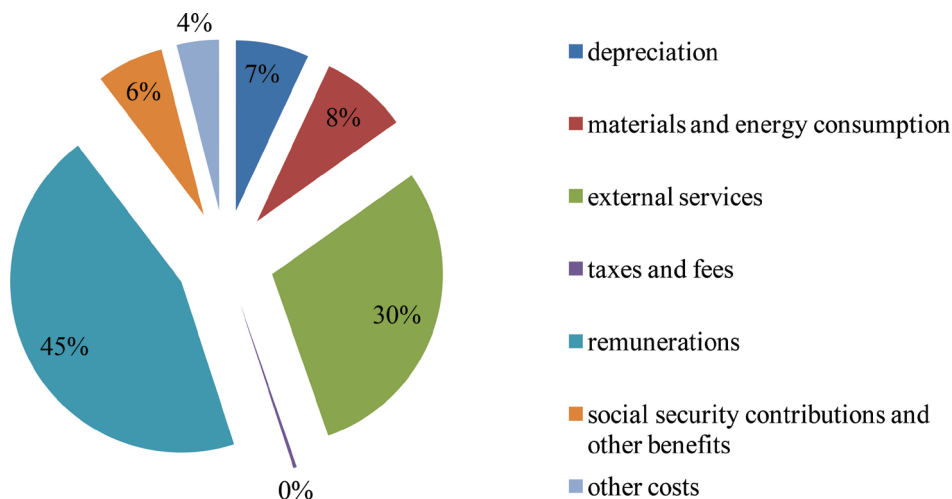
- $C_{OA}$  – costs of operational activity (PLN)
- $C_{OP}$  – other operational costs (PLN)
- $C_F$  – financial costs (PLN)

## RESULTS AND ANALYSIS

It was found that the highest costs, are associated with remunerations (45%), followed by external services, c.a. 30%, materials and energy consumption makes up c.a. 9% and comparably, social security contributions and other benefits generate c.a. 6%. Fig.2 shows these relations. The proportion of remu-

neration costs is definitely too high and exceeds the value generated in other enterprises, where this value is on average 23%. This category includes employment and civil contracts, but the costs of permanent contracts are predominant (85%).

**Figure 2.** Analysis of logistic costs in an enterprise according to by nature criterion



The costs of lease and tenancy of storage facilities (32.8%), leasing costs (14.6%) and costs of services connected with machinery and equipment repairs, including trucks, office or storage equipment making up 10.5% make up the highest proportion of the external services. These are the costs of maintenance of logistic equipment, whose share may be decreased by a proper control of the exploitation of the above mentioned material goods.

Fuel costs (32.2%) prevail in the structure of costs associated with materials and energy consumption followed by the costs of water and energy procurements (17%), i.e. the costs of transport and general infrastructure.

It can be concluded that in the logistic costs, the non-material costs (see fig.1) only slightly predominates over material, with share of 51% of total logistic costs.

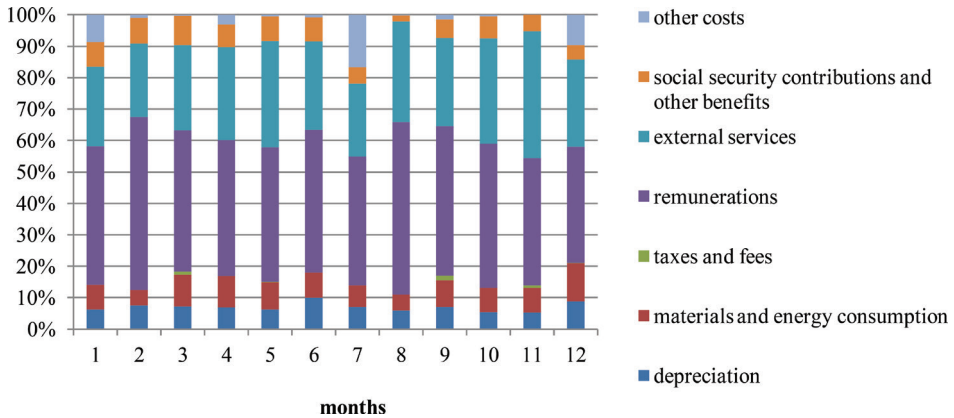
A similar tendency is apparent in the analysis of logistic costs structure in the subsequent months of the company operation (showed on the fig. 3). It was established that the costs distribution per individual months was mainly affected by the demand.

Two costs categories have the greatest variability: Taxes and fees and Other costs. The coefficient of variation is 178% and 167%. It is obvious, because these categories include irregularly payments, which are: motor and asset insurances and taxes.

The remuneration costs have the lowest variability. Employment and

salaries are at a similar level throughout the year and there is no significant seasonal employment.

**Figure 3.** Changes of the costs by nature structure in the analyzed enterprise



**Table 2.** Logistic costs indicators

Indicator	Value
<b>Share of individual types of costs in the turnover:</b>	
Depreciation $S_{c_d}$	0.72
Materials and energy consumption $S_{c_{me}}$	0.86
Taxes and fees $S_{c_{tf}}$	0.03
External services $S_{c_{es}}$	3.08
Social security contributions and other benefits $S_{c_{sc}}$	0.66
Other costs $S_{c_o}$	0.42
Remuneration costs $S_{c_r}$	4.33
<b>Share of total logistic costs in the turnover <math>S_{TCL}</math></b>	<b>10.10</b>
<b>Share of total logistic costs in the costs total <math>S_{CL}</math></b>	<b>10.65</b>

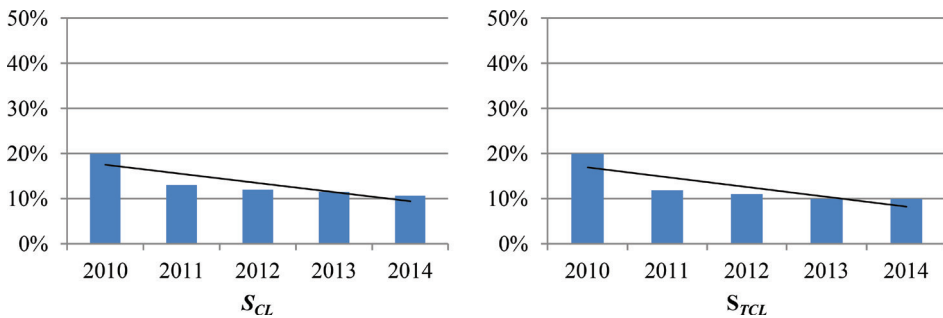
The share of logistic costs was increasing with growing demand. The higher number of the orders, the more the costs of materials and energy consumption were growing, including fuel, which was associated with a higher number of deliveries and higher commissions and remunerations, which constitute the highest percentage in the whole breakdown of costs by nature. Values of the selected indicators were compiled in Table 2.



In the agribusiness companies in Poland, the share of logistic costs in total costs is between 5 and 9% (Rokicki, 2012). In the analysed enterprise, a higher  $S_{CL}$  value may evidence greater importance of logistic in the company's activity. In the transport industry, the share may reach even 80% (Malinowski, 2016). On the other hand, the share of logistic costs in the turnover, according to various authors, fluctuates from 6% to 40%, with an average for all industries c.a. 5%, whereas for the wholesale the proportion is over 7% (Engblom, *et al.*, 2012, Kaczmarczyk, 2012; Klepacki *et al.*, 2013; Rokicki and Wicki, 2010). The lower the indicator of costs level, the higher the assessment of economic efficiency of the company.  $S_{TCL}$  value on the level of 10% may be regarded as satisfactory, although possible reduction of this indicator should be sought.

The percentage of logistic costs in relation to the company's total costs and to the company's turnover for the 2010-2014 period was presented to check and assess the company's functioning regarding the logistic costs (fig.4.).

**Figure 4.** Share of logistic costs in the period 2010-2014



As may be seen, on the fig.4., the percentage of logistic costs reveals a decreasing tendency from year to year. Over 4 years the share of logistic costs decreased by half. It is partly the result of implementing the controlling system and controller position in the enterprise by the end of 2010.

## CONCLUSIONS AND SUMMARY

It may be stated that in the presented agribusiness enterprise the amount of logistic costs is on a satisfactory level. The value of logistic costs in the company is affected mainly by:

- remuneration costs (they cover 45% of total logistic costs),
- costs of external services, i.e. lease and tenancy, and repair services (maintenance of logistic equipment, ca. 30% of total logistic costs),
- costs of materials and energy consumption, in which fuel makes up the highest percentage (the costs of transport and technical infrastructure).

Remuneration costs are associated with permanent employment and have a low variability. It will be difficult to reduce them, regarding the decreasing tendency of logistic costs share. Since a majority of enterprises strive at continuous cost minimisation, in this case it would be advisable to:

- minimise, when possible, the costs of external services and remuneration, which make up the highest percentage of logistic costs,
- improve sales policy, striving to increase the sales (and therefore the turnover), which will influence a decrease in the indicator of logistic costs share in general statement.

As has been established, fuel has a considerable share in the costs. A better utilisation of the GPS system for planning rational and optimal routes for deliveries may help to reduce this value. It could be also a possibility to reduce the drivers remunerations. Lease and tenancy, as well as repair services make up a high percentage of external services. Reduction of these costs might be possible owing to a better utilisation of rented spaces or reducing the stock quantity.

A declining tendency of logistic costs share has been observed and the result is compatible with the worldwide trends. However, the obtained results may testify a high diversification of logistic costs among food sector companies.

Presented discussion illustrates the complexity of logistic costs. Indicating the logistic areas and types of costs associated with them are only some aspects of important problems forming an operational decision base for enterprise management.

Logistic costs belong to indirect costs and their amount increases with the development of service providing businesses and increasing automation of production processes. Application of such accounting tools as cost calculation and cost accounting cause, that information about unit costs is more precise and provides information basis for the managing staff.

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