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**Logistics costs analysis as an assisting tool to achieve competitive  
Advantage for agricultural enterprises**

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# LOGISTICS COSTS ANALYSIS AS AN ASSISTING TOOL TO ACHIEVE COMPETITIVE ADVANTAGE FOR AGRICULTURAL ENTERPRISES

**Abstract.** An attempt of evaluation of level and structure of logistics costs in chosen great area agricultural enterprises was shown in the paper. Results of research have shown, that great area agricultural enterprises have got high share costs of logistics both in total costs of production – 42,2%, and in selling value of products and services – 27,5%. Costs of physical flow of materials predominate in the structure of total logistics costs of great area agricultural enterprises – 86,5%.

**Keywords:** logistics, agricultural enterprises, logistics costs.

**JEL:** Q12

## Introduction

Rural enterprises acting on free market, so as enterprises of other sectors, should search sources of competitive advantage on several fronts. To be distinguished in clients eyes on background of competitors by diversification of own offer can be one way of this advantage. Taking into account a fact of food's overproduction, second of ways, which seems for rural enterprises more advisable, is permanent searching of capabilities of cost reduction of own activity, achieving higher profits same. Input to sphere of enterprise management a concept of logistics is one of a manner of introducing to life of the second way of achieving competitive advantage. The main principles of the concept can be define as follows: "Logistics it's a process of strategic management of supply, relocation and storage of raw material, not finished production and final products, also information flows both in the enterprise and within its marketing channels, in order to, that present and future profitability will be maximized by cost effective realization of orders".

Taking into account above-mentioned, question of cost of logistics becomes the main key. The issue of logistics costs has a complex character both with reference to the process surface and to objective one in their forming aspect. Complexity in a process surface means costs of whole flows of materials and information within the enterprise. In an objective surface, costs present a decrease of enterprise property in connection with preparation and realization of logistical process (Nowicka-Skowron, 2000, Twaróg, 2003). In spite of high importance of complex treatment of logistics costs, this problem does not find appropriate place both in economic literature and practical activity of enterprises. How this issue is so important, let's fact shows, that in highly developed countries, average level of logistics costs is about 20-30% of whole enterprise's costs (Rzymyszkiewicz, 1995). In Poland some attempts of identification of level and structure of logistics costs are undertaken, but they still do not have a systematic and complex research character (Blaik, 2001). Application of traditional methods of book-keeping in enterprises is an important limitation of development of complex account of logistics costs. A present book-keeping does not get efficient information, because of lack of adjustment for explanation of modern logistics problems. Therefore, creation a proper system of cost analysis, orientated on logistics, is one of the most important requirements of enterprise today.

Taking into account above-mentioned considerations, an attempt of estimation of level and structure of logistics costs in chosen great area enterprises was undertaken in the research. This research should be treated as initial research, orientating us about a scale of the phenomenon, and giving methodical base of logistics cost estimation in such kind of enterprises.

## Material and methods

The initial research was conducted in four great area rural enterprises located in Wielkopolska region in 2003. Taking into account organizational structure aspect, these enterprises consist of from 3 to 5 separate but strongly connected units-farms. Area of analyzed enterprises fluctuated from 1067 ha

of agricultural land to 3628 ha of agricultural land. These enterprises led typical agricultural production about similar structure.

In scientific literature of logistics, taking into account complexity of presented problems, can be find many definitions of logistics cost. Taking into account a comprehensiveness of problems above mentioned cost and specificity of analyzed enterprises, a definition of logistics costs suggested by Sarjusz-Wolski and Skowronek (1999) was used in the research. These authors define logistics costs as labour inputs, means and objects of work, financial expenses and also other negative results of extraordinary events caused by flow of material goods (raw material, materials, products, commodities) within the enterprise and between enterprises and inventory costs as well.

Logistics costs can be presented in different profiles. Basic structure profiles of logistics costs and connections themselves were shown on fig.1. Taking into account the aim of this analysis (estimation of level and structure of logistics costs also their connections with basic kinds of logistical processes in the enterprise), the calculation was made based on the profile of costs according to basic elements of logistics processes – physical flow of material, inventory and information processes. Calculation according to above-mentioned profile of costs and taking specificity of rural great area enterprise into consideration was made as follow (1):

$$C_l = C_{pfm} + C_{inv} + C_{inf} \quad (1)$$

Particular groups of costs:

a) costs of physical flow of material ( $C_{pfm}$ ):

- \* depreciation costs of property which is involved in logistical processes ( $C_d$ ),
- \* leasing costs (lease for square, garages, internal ways) ( $C_l$ ),
- \* labour costs ( $C_{lb}$ ),
- \* use costs of oil, materials and energy ( $C_{ome}$ ),
- \* costs of transport external services ( $C_{tes}$ ),
- \* other costs of flow (taxes and insurance of transport means, repairs and preservation of equipment) ( $C_{oth}$ ).

b) inventory costs ( $C_{inv}$ ):

- \* costs of inventory leasing ( $C_{invl}$ ),
- \* labour costs ( $C_l$ ),
- \* costs of stock losses (losses during evaporation, going stale of stock, diseases, pests) ( $C_{sl}$ ),
- \* other costs (insurance, energy, cost of inventory capital) ( $C_o$ )

c) costs of information processes ( $C_{inf}$ ):

- \* labour costs (also material and energy costs) ( $C_l$ ),
- \* depreciation of information equipment ( $C_d$ ),
- \* costs of telecommunication services ( $C_{ts}$ ).

Kind's profile of costs

Profile of costs according to phase of flow and formation place

Profile of costs according to basic elements of logistics processes

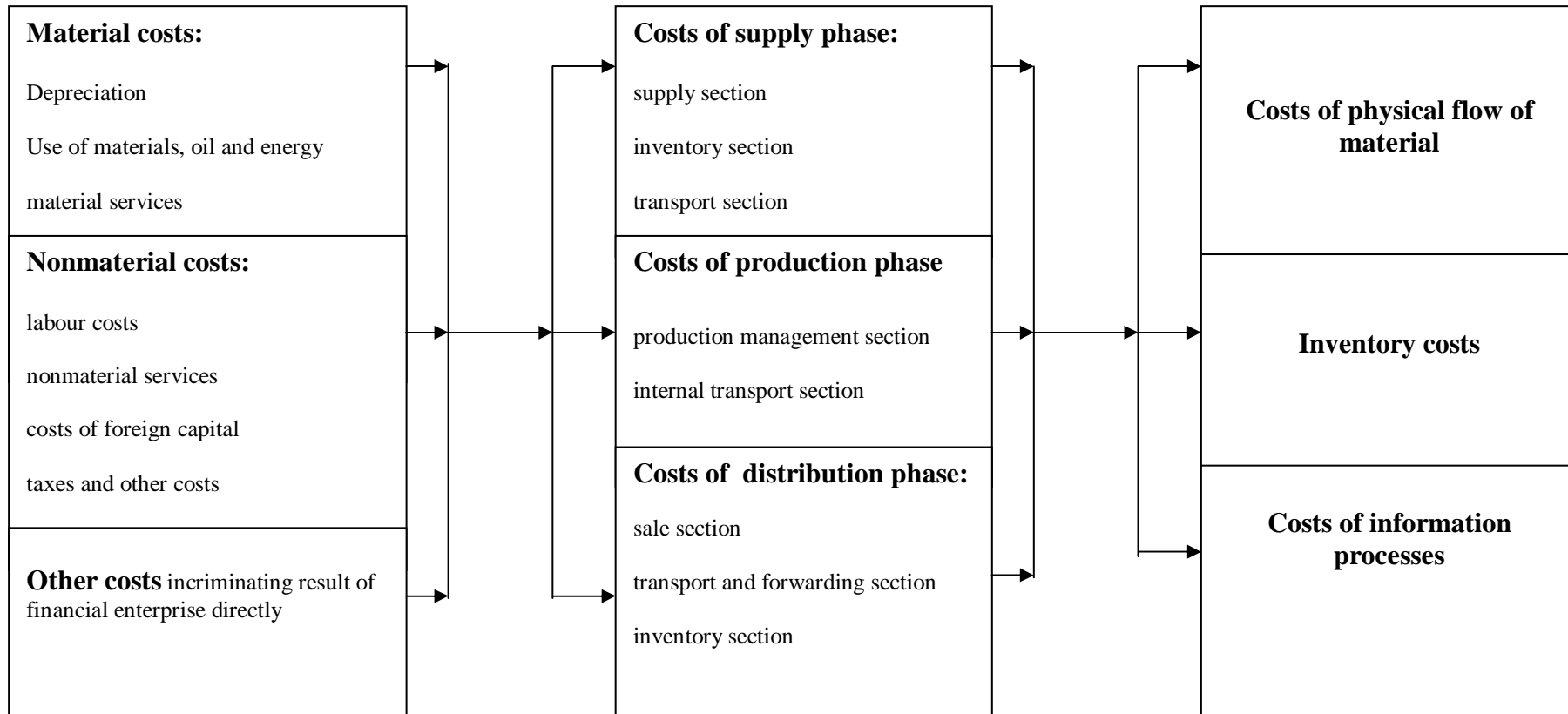


Fig. 1. Basic structure profiles of logistics costs and connections themselves.

Source: Skowronek C., Sariusz-Wolski Z., „Logistyka w przedsiębiorstwie” PWE 1999

## Results

The level of logistics costs can be characterized by some economics categories describing activity of enterprise, for example in relation to total costs of activity or to selling and services value. The results of research, conducted in chosen rural great area enterprises, showed high share of logistics costs in total costs in comparison for non-agricultural enterprises. The index of share was 42,2% whereas in non-agricultural enterprises fluctuates from 20% for 30% (table 1). Similar relation is observed in comparison analysis of index showing share of logistics costs in relation to selling and services value. In researched enterprises average level of this index has amounted to 27,5%, whereas in some other kind of enterprises, as show research carried in high developing countries, this index amount to merely, from 5,8% for 12,1% - (Blaik, 2001; Christopher, 2000; Skowronek and Sarjusz-Wolski, 1999 ). However, we must consider this comparison very carefully, in view of two aspects at least. Firstly, existing differences in specificity of particular sectors and kind of enterprises – the research in western countries was led in non-agricultural enterprises. And secondly, we should take under note the fact that in western countries accustoming of logistics principles and making of logistics cost analysis has already started in 60-ties last century. Those research showed, that level of the index has amounted to 21,8% (Pfohl, 1998) - and it led to successive pulling down a participation of this cost.

Table 1. Level and structure of logistics costs in great area agricultural enterprises according to basic elements of logistics processes.

Specification	Level of logistics costs in PLN per ha AL	Structure of logistics costs in %	Share of logistics costs in total costs in %
<b>Costs of physical flow of materials:</b>	<b>1272,3</b>	<b>86,5</b>	<b>36,5</b>
Depreciation	112,2	7,6	3,2
Leasing	20,4	1,4	0,6
Labour costs	366,3	24,9	10,5
Use costs of oil, materials and energy	640,6	43,6	18,4
Costs of transport services	34,4	2,3	1,0
Other costs of flow	98,4	6,7	2,8
<b>Inventory costs:</b>	<b>178,7</b>	<b>12,2</b>	<b>5,1</b>
Costs of inventory leasing	67,5	4,6	1,9
Costs of inventory workers	28,4	1,9	0,8
Costs of stock losses	31,9	2,2	0,9
Other costs (insurance)	50,9	3,5	1,5
<b>Costs of information processes:</b>	<b>19,4</b>	<b>1,3</b>	<b>0,6</b>
Depreciation	2,5	0,2	0,1
Labour costs	13,8	0,9	0,4
Costs of telecommunication services	3,1	0,2	0,1
<b>Total logistics costs</b>	<b>1470,4</b>	<b>100,0</b>	<b>42,2</b>
Other costs in enterprise	2005,4	x	57,8
<b>Total costs</b>	<b>3475,8</b>	<b>x</b>	<b>100,0</b>
<b>Selling value of products and services</b>	<b>5348,7</b>	<b>X</b>	<b>100,0</b>
<b>Share of logistics costs in selling value of products and services</b>	<b>1470,4</b>	<b>X</b>	<b>27,5</b>

Source: Own research.

Carried analysis has allowed to indicate logistics cost indexes (in PLN per 1 ha of agricultural land) of particular logistics activities in rural great area enterprises. From data presented in table 1 follows, that general level of logistics cost index for this kind of enterprise amounted to 1470,4 PLN per 1 ha of agricultural land. But over 86% of this level is connected with cost of physical flow of

materials - 1272,3 PLN per 1 ha of agricultural land. If we analyzed this complex of logistical operation in detail we notice, that highest costs are related with expenditure of fuel, materials and energy – 43% and cost of labour - near 25%.

Whereas the inventory cost index has been formed at the level of 178,7 PLN per 1 ha of agricultural land. In this group of logistics costs, the highest participation is related with leasing of store houses – near 38%. Research have showed, that information flow in analyzed enterprises, has generated merely 1,3% of general logistics costs. It has given 19,4 PLN per 1 ha of agricultural land index. Cost of labour has turned out a predominating cost in this group – 13,8 PLN per 1 ha of agricultural land.

Based on carried comparative analysis concerning participation of basic elements of logistics costs (table 2), important differences within the elements mentioned above between researched agricultural enterprises and non-agricultural enterprises are ascertained.

Table 2. Share of basic elements of logistics costs of the investigated enterprises in comparison with enterprises of other sectors.

An element of logistics costs	Share of basic elements of logistics costs in total logistics costs in %	
	Investigated enterprises	Non-agricultural enterprises
Costs of physical flow of materials	86,5	40-50
Inventory costs	12,2	30-40
Costs of information processes	1,3	15-20

Source: Own research and Skowronek, Sarjusz-Wolski „Logistyka w przedsiębiorstwie”.

Cost of physical flow of materials in the researched rural great area enterprises is the highest cost in total logistics costs – 86,5%. This index is near about 50% higher than in non-agricultural enterprises. This could be explained by two facts. First, there is the specificity of agricultural production and the second one is organizational structure of the investigated enterprises (each of them is consists of 3 to 5 units and distance between them is sometimes around several kilometers). Taking into account facts mentioned above, almost 90% of these costs are connected with internal transport and transport between particular units. There are some specific features of transport in agricultural production:

- expanse character of agricultural production,
- seasonal character of agricultural production,
- diversity of transported loads,
- requirement to have many miscellaneous transport means,
- global transported mass (from the point of view both of transported tones and multiple of move) is very large,
- one-way of agricultural transport,
- small distances transportation on bad quality roads ( mostly dirt roads)

From results of earliest research follows that, taking into account direction of production and level of intensity, from 20 for 80 tones on each hectare of agricultural land are transported (Wajszczuk,1994, Wielicki,1983). Therefore, already in 1913 Albrecht Thaer formulated known affirmation, that “...agricultural enterprise is a transport enterprise in spite of will” (Wolszczan, 1988).

However, in external transport of analyzed enterprises, in last years are observed gradually getting changes in structure of inputs. Recently, most of more of these inputs, cooperating firms take

over from agricultural enterprises (both suppliers of means and receivers of products) - phenomenon outsourcing.

From analysis of second element – inventory cost – we noticed, that its participation in logistics costs of agricultural enterprises is around 3,5 times smaller in comparison with non-agricultural enterprises. It can be a result of several circumstances. Firstly, in researched enterprises, majority of fabricated agricultural products can be characterized as raw materials for farthest processing and short period of freshness. Secondly, the enterprises want to get back their engaged capital very quickly in order to start the next productive cycle again, so most of agricultural enterprises sell their products immediately. Based on this fact, it is possible to put hypothesis saying about it, that enterprise which is located in the supply chain “near the final receiver”, has higher inventory costs because it must keep certain level of stock for assurance of liquid service of clients. Analyzed enterprises are placed at the beginning of such supply chain. Thirdly, currently, contrary to the past years, the agricultural enterprises do shopping of production means just before their use for production. In this way the enterprise is limiting costs of engaged capital to minimum. This fact has caused, that in analyzed enterprises some store surface was not used fully. Such situation is also a result of rules of past economic system. Before 1990, the agricultural enterprises because of general lack of production means, had to buy them very early and consequently store them for a long time. So, it considerably increased cost of storage.

In agricultural enterprises costs of information processes present the lowest participation in total costs of logistics – 1,3%, whereas in non-agricultural enterprises this index is higher on average 13-times. As research have shown, such big disparity between compared enterprises is a result of practically lack of information investment (both software and hardware type). Still today, the basic means of information transfer is phone and fax. Like in case of non-agricultural enterprises, we can assume, that during developing of contacts with market and increase of competition, the level of this cost will grow.

## Conclusions

Carried logistics cost analysis, in agricultural enterprises, has allowed formulating following conclusions:

1. There is a high share of logistics costs in total costs of production in agricultural enterprises in comparison with non-agricultural enterprises. The index was about 42% in case of relation to total costs and around 28% in relation to selling and services value.
2. Carried analysis has allowed estimating levels of logistics costs indexes both in total aspect and for particular elements of logistics costs. General level of logistics cost index for agricultural great area enterprises has amounted to 1470,4 PLN per ha of AL. The structure of this index as follows: 1272,3 PLN per ha of AL was related with physical flows of materials, 178,7 PLN per ha of AL was related with inventory costs, and finally 19,4 PLN per ha of AL has been generated by information processes.
3. Specificity of agricultural production causes, that in rural enterprises costs of physical flows of materials predominate in total logistics costs – 86,5%. Costs of inventory but especially costs of information processes present insignificant participation in total logistics costs.
4. It must be note a high participation of labour costs - around 28% in total logistics costs. First of all, these costs are related with onerous transport work like loading and unloading.
5. Carried analysis shows, that logistical processes exert a wide-ranging and important influence on business of agricultural enterprises. Based on experiences of high developing countries in putting into practice principles of logistics and visible effects from these operations, we see the necessity of complex approach to the issue and based on this way looking for manners of reduction of logistics cost.

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