

## **THE LEVEL OF LOGISTICS AND THE SOLUTIONS IN THE FIELD OF INFORMATION TECHNOLOGY APPLIED IN AGRIBUSINESS ENTERPRISES**

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The paper presents the relationship between the level of logistics and the solutions applied in the agribusiness enterprises. The research was conducted in 504 companies. The logistics level was determined on the basis of contribution of cost of logistics in the overall expenses of the company and based on existence of a separate logistics department in a given company. Relevant dependence has been detected only between existence of a separate organisational unit dedicated to logistics and the solutions applied in the area of logistics. For level of logistics costs, in most cases, no significant correlation with the use of information technology was seen. The share of cost of logistics in company expenses was determined to be a poor indicator of level of logistics and modernity of the company.

Keywords: information systems, logistic, agribusiness

### **1. Introduction**

The logistics may be defined in many ways. It is a concept covering organisation, control and execution of flow of goods from place of manufacture to place of final purchase at minimum cost and minimum employment of funds [7]. According to Rutkowski the logistics deals with the management of operations of moving and storing in order to facilitate the flow of products and information from place of manufacture to the consumer at a reasonable cost [2]. According to Bozarth and

Handfield the Logistics is a part of the supply chain, which deals with the planning, implementation and control of smooth and efficient flow of goods, services and information from the point of origin to point of consumption in order to meet the needs of the consumers [3]. A characteristic of all the definitions is not only smooth flow, but also avoiding the loss of time, quantity and funds. Logistics therefore relates to cover time and space in execution of flow of goods [6]. It enters into a number of relations with many functional areas, such as manufacturing, marketing and accounting [4]. The logistics, as a science, is in a continuous evolution, new theories are proposed and verified [13]. Of course, there are some classical assumptions, which remain unchanged.

The level of logistics in a company may be measured in many ways. In this paper the author used cost of logistic activity and existence of one separate department dedicated to logistics to determine the level of logistics. Small enterprises are usually characterised by low level of logistics development [15]. The conducted research confirms relation between company size and existence of a separate logistics department in its organisational structure. In small enterprises the presence of the logistics department is often unreasonable, whereas a large enterprise cannot operate effectively without such a department [1]. The logistic cost is more and more significant in the expenses borne by the enterprises. Its value depends mainly on the level of customer service and market competition. There are strong substitutive relationships between each type cost [10]. In 2008, as compared to 2003, logistics cost increased by 20%. A reason for this situation was increased cost connected with increased needs of the consumers. Reduction of expenses in the supply chains did not help too much [8]. In addition to smooth flow, the cost of the employed solution is a very important factor in assessment of the company logistics. The aim is to find economic balance between the expenses and robust handling of the material stream and service quality [12].

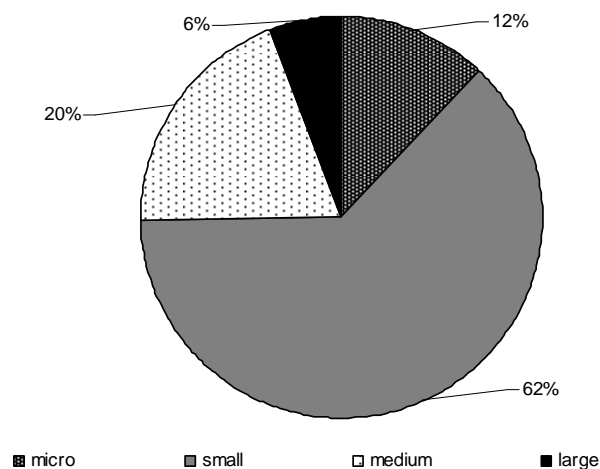
The information accompanies the flow of goods; it is the most important element building the efficient supply chain, and thus the customer satisfaction. Therefore the logistics of information should be effective both inside as well as outside of the company [16]. Fulfilment of the assumed goals is possible using the information system, that is, a tool integrating the data coming from multiple sources into a single stream of information [11]. The software for optimising the production and the logistic processes, for conducting simulations as well as real time planning and scheduling, is offered on the market [14].

The agribusiness enterprises are still unexplored in terms of logistic solutions, including the solutions related to use of the information systems. The entities active in this sector differ from other production and service companies. In addition, the differences exist in each sector, for example, in terms of organisation of supplies,

model of relationships with the suppliers, seasonality of production, sales organisation, impact [9]. There are only a few detailed studies on management of logistics in agribusiness enterprises [5]. Therefore the subject taken is very important.

## 2. Methods of research

The aim of the paper to determine dependence between the relationship between the level of logistics and the solutions applied in the enterprises active in the main sectors of the agribusiness. The data has been collected based on survey, made from December 2009 to March 2010. The polls have been sent to all the enterprises classified as small, medium and large enterprises, operating in the food processing sector, existing in the REGON database and to randomly selected 1 500 micro-enterprises. The overall number was 10 000 enterprises. 511 answers were received (5.11%). The data for this study was used without processing, the analysis did not include only records with missing data, and thus 504 polls were considered. The structure of the companies by number of employees is shown in Figure 1.



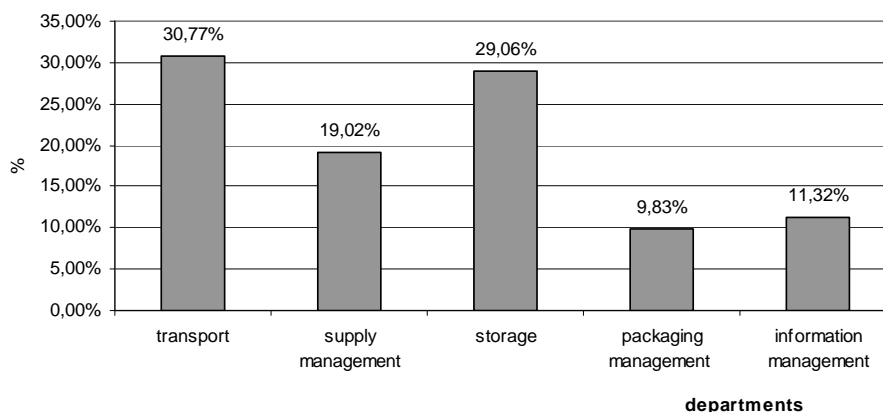
**Figure 1.** Structure of the enterprises surveyed

The companies from the following sectors of the agribusiness were selected to the study: meat production and processing, fruit and vegetable processing, dairy production, production of grain mill and starch products, production of bakery and flour products, production of feed for animals, production of drinks. Primarily graphical analysis was used for data analysis. Due to properties of the data collect-

ed in nominal and ordinal scales. In order to determine the correlations between the selected traits also the chi square statistical test was employed.

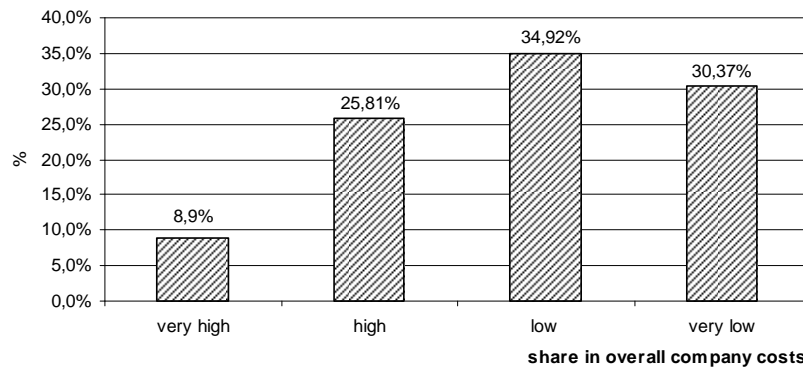
### 3. Research results

The logistics level was determined on the basis of contribution of cost of logistics in the overall expenses of the company and based on presence of a separate department (person) dedicated to logistics. The enterprises unambiguously declared that they had or did not have a logistics department. Only 20% of the companies had such a department. This result demonstrates a general low level of logistics. Companies more often decided to separate organisational unit dealing with a selected area of logistics (fig. 2). Most often the companies established departments to deal with transport as well as storage. Such a result is not surprising, since for the companies the most important are production and distribution. Information management and packaging management units were the least rare ones in the agribusiness companies.



**Figure 2.** Functioning of separate logistics departments in agribusiness enterprises, multiple choice (%)

The share of cost of logistics in the overall company expenses demonstrates the importance of logistics activities (fig. 3). Most often companies bore low logistics expenses (35% companies) or very low (30% companies). There were few units in which the expenses were very high. These results indicate low importance of logistics in the analysed enterprises.



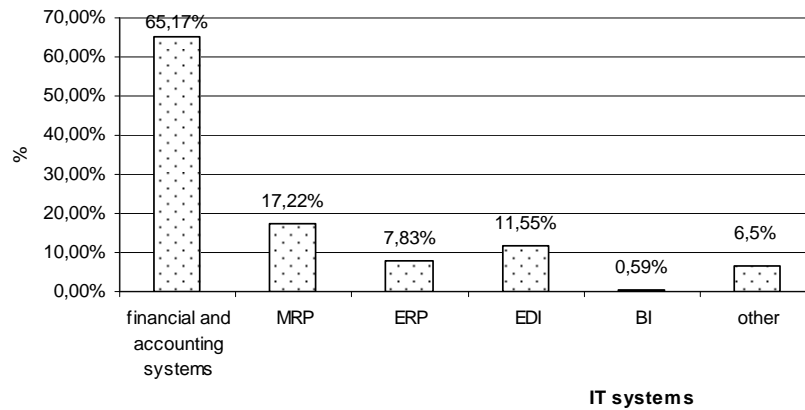
**Figure 3.** The share of logistics costs in the overall cost in agribusiness enterprises (%)

Having a single comprehensive IT system allows the company to plan, coordinate and supervise its operations. Only 21% of the surveyed companies had a comprehensive system. Additional advantage to a comprehensive system is easy data transfer between different units of the enterprise. The surveyed enterprises made use of various IT systems. The most commonly used were financial and accounting systems – FK (fig. 4). Such systems were used by 65% companies. MRP System (management of material and production resources) was used by 17% companies. ERP systems (enterprise resource management) were used less often than MRP (only 8% companies). Electronic data interchange (EDI) was used in 12% enterprises. Expert Decision Support System (BI – Business Intelligence) was used by a few companies. Enterprises also made use of other systems (7% companies), but they did not disclose their names. The purchase of the specialised software is connected with high expenses, therefore the companies commonly use available finance & accounting systems.

The performed  $\chi^2$  test for independence of variables showed dependence between the existence of a separate logistics department in the company and having a single, comprehensive IT system ( $\chi^2_{emp} = 9,78$ ,  $\chi^2_{0,05} = 3,84$ , p-value = 0.001, df = 1). Whereas no dependence between cost of logistics and existence of a single IT system in the company was shown.

The performed  $\chi^2$  test for independence of variables showed dependence between the existence of a separate logistics department in the company and using a MRP system ( $\chi^2_{emp} = 10.78$ ,  $\chi^2_{0,05} = 3.84$ , p-value < 0.05, df = 1), ERP system ( $\chi^2_{emp} = 11.93$ , p-value < 0,05), EDI ( $\chi^2_{emp} = 30.39$ , p-value < 0.05). Nonetheless the hypothesis on lack of dependence between the existence of a dedicated logistics department and the use of accounting system was confirmed ( $\chi^2_{emp} = 3.57$ ,  $\chi^2_{0,05} = 3.84$ , p-value < 0,05, df = 1). A similar situation took

place in the case of the BI system ( $\chi^2_{emp} = 2.12$ , p-value < 0.05). However no dependence between cost of logistics and use of each above-mentioned system was found (FK, MRP, ERP, EDI, BI).

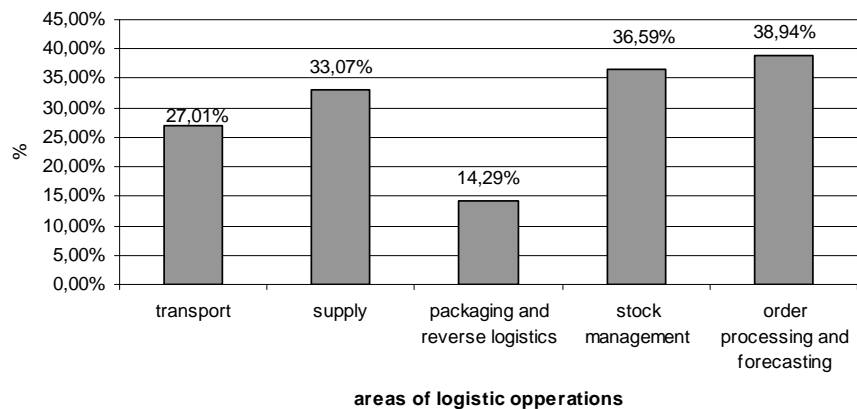


**Figure 4.** The IT systems supporting the logistics of the agribusiness companies – multiple choice (%)

In the agribusiness sector enterprises usually storage management as well as order processing and stock management was supported by the IT systems (fig. 5). To a lesser extent modern IT solutions were used in the transport. Package management was the least supported. The results of the survey show that the companies employ IT solutions in key departments and in units, which are characterised by a high degree of complexity.

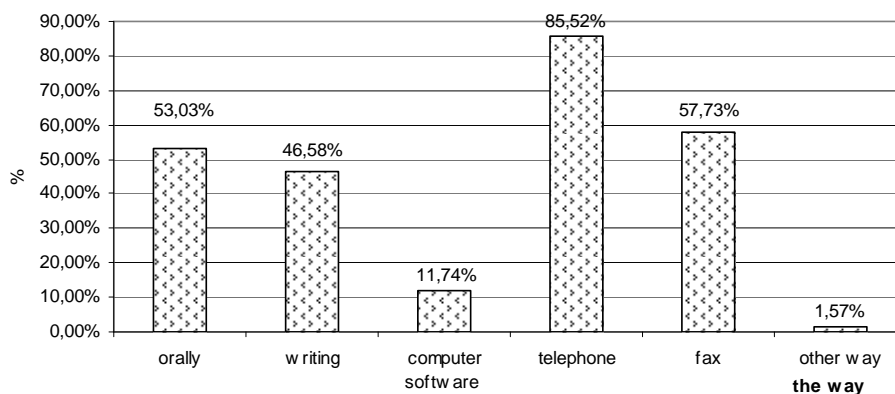
The performed  $\chi^2$  tests for independence of variables showed lack of dependence between the existence of a separate logistics department and the IT supported order processing and forecasting ( $\chi^2_{emp} = 3,82$ , p-value < 0.05) as well as the presence of strong dependence the IT supported transport ( $\chi^2_{emp} = 24.09$ , p-value < 0.05), stock ( $\chi^2_{emp} = 27.80$ , p-value < 0.05), packaging department and reverse logistics ( $\chi^2_{emp} = 9.44$ , p-value < 0.05), stock management ( $\chi^2_{emp} = 20,29$ , p-value < 0,05).

The hypothesis of no relation between the level of logistics cost and the IT supported transport department was rejected ( $\chi^2_{emp} = 5.87$ ,  $\chi^2_{0,05} = 7.81$ , p-value = 0.05, df = 3). Similarly, in case of IT supported packaging and reverse logistics departments ( $\chi^2_{emp} = 3.14$ , p-value < 0.05) and operations related to order processing and forecasting ( $\chi^2_{emp} = 5.24$ , p-value < 0.05). Whereas small dependence between the level of logistics cost and aided stock management ( $\chi^2_{emp} = 8.72$ , p-value < 0.05) and storage management ( $\chi^2_{emp} = 10.15$ , p-value < 0.05).



**Figure 5.** The areas of IT supported logistic operations in the agribusiness companies - multiple choice (%)

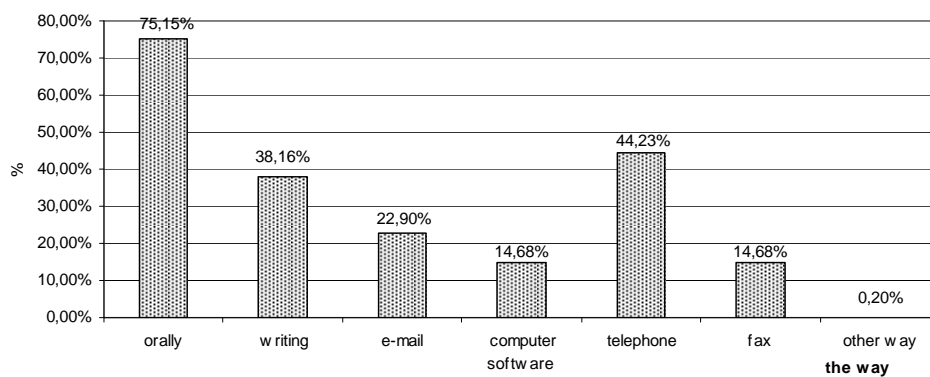
When dealing with external partners (suppliers and customers) information was transmitted mostly by telephone (fig. 6). 50% enterprises used or gave the instructions orally or in writing. Use of the records stored in the computer software was not popular. Only if the units are strongly related, the flow of information in such a way is possible. In external contacts traditional methods of communication were used, and the share of modern tools in the form of computer software was low.



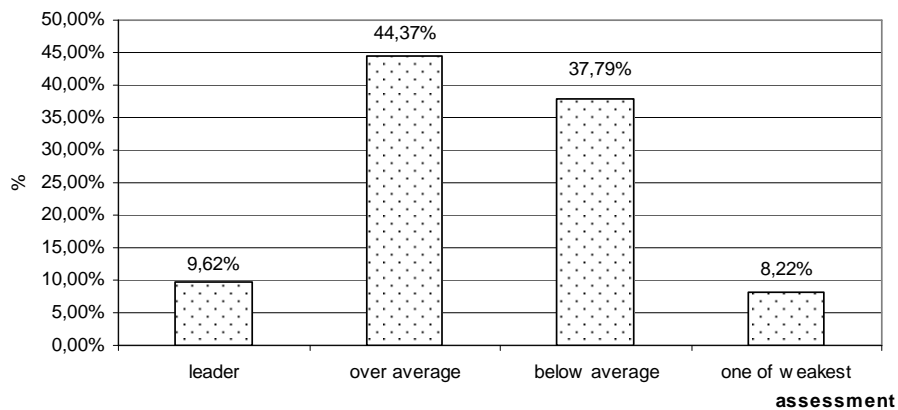
**Figure 6.** The way in which information in contact with external partners was delivered in agribusiness enterprises - multiple choice (%)

The information inside the company was usually provided orally (fig. 7). The information was also provided by phone and text written down on the paper. More

modern methods of communication, such as e-mail, fax or storing in computer software, were used by very small percentage of the companies. Small businesses, because of the number of employees, used direct communication. In large companies more formal solutions were used. A small percentage of companies used computer for internal communication.



**Figure 7.** The way in which information was delivered inside the company in agribusiness enterprises - multiple choice (%)



**Figure 8.** Assessment of the information management in agribusiness enterprises as compared to the competitors - multiple choice (%)

IT support in the company was regarded as similar to other companies active in this sector. A small percentage of companies saw IT management in their enterprises as worse or even one of the worst in the sector.



#### 4. Conclusion

The agribusiness enterprises still focus on production activity, and to a lesser extent they see they opportunities in the implementation of the logistic solutions, including IT solutions. The low share of logistics cost in total cost just confirms this regularity. The level of logistics in a company can be assessed either on the basis of the presence or absence of a separate department dedicated to logistics.

The conducted research showed relation between presence of a separate logistics department and having a single comprehensive IT system or use of specialist systems, such as MRP, ERP, EDI. The use of modern information technology solutions is connected with huge initial expenses. In respect of the above, it could be afforded by large companies and, as the research showed, they were the companies aware of the importance of efficient logistics in the enterprise. Smaller companies commonly used finance & accounting systems, which serve for accounting operations and are necessary for the operation of the company. Whereas the BI systems were used very rarely. No actual relation between the level of logistics cost (measured by share in the total cost) and using modern IT solutions. The level of logistics costs does not show the scale of the enterprise activity. Generally small companies incur relatively high costs of logistics, and large companies purposefully incur expenses related to activity of the various areas of logistics.

The information in companies either internal, or in contact with external partners is delivered via traditional channels. A few companies used computer software for communication.

Logistics in agribusiness companies was at a low level, a similar situation was in case use of modern logistics solutions. The companies may benefit much from implementing logistic solutions in their activity, among others, by using modern IT tools. A limitation, especially for small businesses is the cost of purchasing and implementing these solutions.

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