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## **OUTSOURCING STRATEGY SELECTION FOR TRANSPORTATION SERVICES BASED ON THE MAKE-OR-BUY DECISION**

**Summary.** This paper is related to the practical approach to logistics strategies in enterprises and advanced practical applications. This article presents an analysis and solution to a specific problem, which is the subject of transport in the enterprise. It presents an analysis based on Make-or-Buy decision involving the selection of best internal or external transport service. It will be used for an exemplary production company. This case study presents the basis for the construction of logistics strategy of the company as a competitive advantage in the market.

## **WYBÓR STRATEGII OUTSOURCINGOWEJ NA USŁUGI TRANSPORTOWE NA PODSTAWIE DECYZJI TYPU MAKE-OR-BUY**

**Streszczenie.** Niniejszy artykuł jest związany z praktycznym podejściem do strategii logistycznych w przedsiębiorstwach i zaawansowanych zastosowań praktycznych. Przedstawiono tu analizę i rozwiązanie konkretnego problemu decyzyjnego, jakim są usługi transportu w przedsiębiorstwie. Przeprowadzono analizę na podstawie decyzji Make-or-Buy pozwalającej na wybór najlepszych usług transportu wewnętrznego lub zewnętrznego. Przykład taki omówiono dla przykładowego przedsiębiorstwa produkcyjnego. Opracowanie takiej analizy stanowi podstawę do budowy strategii logistycznej firmy niezbędnej dla zwiększenia jej przewagi konkurencyjnej na rynku.

### **1. INTRODUCTION**

Market economy and increasing competition are forcing companies to look for new solutions to reduce costs of business. The need for such cost reduction also applies to the transport industry. Taking into account the large share of transport costs in the cost of logistics is to optimize the manufacturing enterprise transport solutions in terms of cost – the problem becomes particularly important.

Transport costs, which in many institutions is about 40-50% of the total logistics cost and from 4-10% of the product price, are often the most important problem to be solved in logistics management. Decisions on transport are of direct relevance to the overall logistics costs, but also to the costs in other functional areas of the company as well as the costs incurred by the other members of the logistics channel [8].

Therefore presented significant problems of general solutions in the field of transport companies are very important. Currently, many companies faced the necessity to take strategic decisions relating to the method of performing activities associated with the movement of their products. Huge impact

on the future of the forwarding, transport and logistics sector will be taken according to strategies chosen by companies. Transport fleet sizing is one of the strategic decisions that can be supported by using make and buy decision-making [10].

Transport plays a decisive role in the efficiently operating economic life. There are various methods within the economy focused on improving the flow of inputs and finished products, as well as reducing the maximum time that elapses between the cycles of production and the final recipient. It demonstrates the growing transport requirements. By introducing advanced production technologies and increasing use of various information systems lead to changes in the location of warehouses and factories. These changes also affect the transport, which are presented new demands, so it becomes more and more integral part of the economic system of supply, production and distribution [3]. Another important factor is the forecast for the development needs of the transport systems [9].

## 2. MAKE-OR-BUY DECISION

Leading a production company is not only about making decisions according to strictly production, but also making a choice of one of two types of transport service: one option is “to make” (purchase its own fleet) or “to buy” transport services (purchase the external service provider). Deciding on these options of transport should therefore consider all the criteria, both for and against it, the fulfilment of which will make it easier to take an appropriate decision on the selection of a particular form of transport service.

Make or buy strategy used in the field of logistics activities focused on the creation of a number of options and to minimize logistics costs. Logistics costs are a component of all the costs of the enterprise, so that such measures make it possible to cut the overall cost.

The level and structure of the company's transport costs depend mainly on the type of industries or sectors within which the firm operates, individual transport requirements as well as the skills, qualifications and real opportunities for logistics management. The logistics cost structure mainly consists of three main groups, which are: the costs of transport, storage and inventory costs [5, 8].

### 2.1. Make or Buy strategy building procedure

In order to make the make or buy decision reasonable following procedure (or as it's called decision tree algorithm is important [7]. Decision-making strategy Make or Buy consists of consecutive six stages/phases as it is presented on Fig. 1.

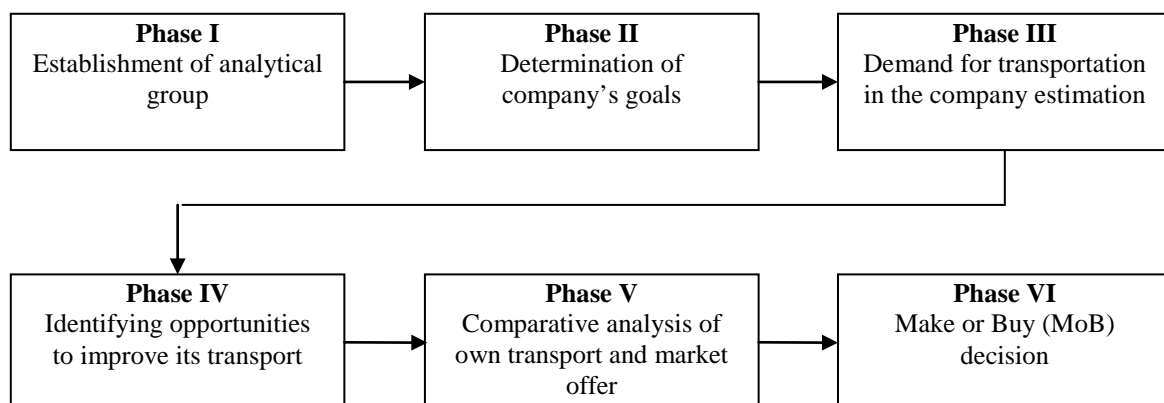


Fig. 1. Make or Buy strategy analysis  
Rys. 1. Analiza strategii Make or Buy

The process should begin by verifying the transport needs of the company, both as to their content and size, as well as a hierarchy of importance.

**Phase I:**

Make or buy decision is characterized by the participation and cooperation of many branches, so it should involve team of people representing different departments within the company.

Establishment of the external transport companies should be preceded by a detailed analysis and evaluation of the qualifications of each member of the team gathered for their education, work experience, professional qualifications, experience and special skills, such as interaction skills in training camp, etc. The team should include at least one member of the board of directors, advisor in matters of transport, distribution and supply specialists for analysis and corporate strategy planning and controlling.

**Phase II:**

At this stage of the make or buy decision is referred to the objective determining what the company wants to achieve.

The gathered analysts team's work should focus on the implementation of strategic analysis in the field of transport, taking into account the dependence between the competitive strategy, the logistics strategy and transport strategy of the company. The analysis should identify members of the general guidelines that may be applied, for example, only certain qualitative characteristics of the transport and the costs incurred by it or whether specific solutions - for example, transport services undertaken on your own (the driver will carry out the duties associated with taking orders and must be paid in addition and appropriately motivated by the company).

**Phase III:**

This stage includes analysis of demand for transportation in the company against the supply of transport services offered by third-party transportation carriers and analysing the costs incurred in connection with the transport activities.

At this stage, the problem of transport in a company requires a thorough capture and analyse a range of issues involved, inherent in the different and interrelated functional and organizational levels. Assuming the necessary comprehensive treatment of many interdependent factors determining the search for optimal solutions in the field of transport in a company, attention should be paid to the form of the load in the transport process, planned and carried out a route, characteristics of the means of transport used, the optimal use of vehicles, current and projected demand for transport with specific parameters, the transport services market.

**Phase IV:**

Within this stage identifying opportunities to improve own transportation is important. The team's work should focus on identifying opportunities to improve company's transport. The methods and models used to improve transport should be verified. The work should aim to optimize transport routes, taking into account both the short and long term. Appropriate techniques to optimize the operation of transport systems should be used. Transport problem may be based on one or several criteria. The purpose of these analyses may be to minimize costs, maximize profits, minimize handling time, maximizing the number of clients served or to minimize the size of company fleet. Also assess the initial impact of the expected changes in transport services should be identified.

**Phase V:**

With this step comparative analysis of the transport with market offer must take place. This step is to compare company's transportation to the offer on the market. In making such a comparison should assume that the prices of transport services transport companies for individual transactions are much higher than for regular customers systematically using the services offered. Therefore it is required to characterize charges of transport company (specifying the amount of fees for individual and group transportation for all transportation combined). All activities are based on the current, continuous market analysis and verified in the course of the changes that take place therein.

**Phase VI:**

In the last stage, the decision is based on the results of the analysis. A final decision should choose whether to implement transport applications in-house by the company or by selecting external service carrier. Transport volumes determined in the planning process of buying option should be compared with the values of the make options. Planning and controlling the transport processes, mutually influence each other. Control can be carried out to monitor the spread of results and examination

processes. Inspection of the results is focused on the end result and the process of planning tasks as well as their solutions. The audit process is controlled by way of creation results or the process of implementation.

## 2.2. Make or Buy strategy alternative solutions

The “make” option which is in fact realization of transport processes in own company (using own resources) requires proper organization of the company. The scope of these activities should cover both the operational part (the planning of transport processes) as well as the technical part including all the attempts to keep the technical performance of the rolling stock of the company efficient.

The “buy” option takes into account first of all the correct choice of the carrier from the outside. This choice must precede such actions as detailed knowledge and understanding of the market, use and application in the operation of all public information resources on the current market and implementation of transport companies ranking. Consideration must be based on data connected with suppliers prices for the services, reliability of performance, availability, etc. These efforts ensure that the right choice was made. This leads to minimize the financial losses that the company would incur in the event of a bad carrier. In the process of Make or Buy decision-making should take into account both the cost aspect and qualitative selection criteria [4].

Make or Buy algorithm otherwise breakeven analysis allows to compare the cost of internal and external transportation of the company. Considered in this method of transport is the scale of the volume of traffic and mostly thus determine at which the carriage of a company pays for maintaining own transport and at which point it’s reasonable to use a carrier from the outside.

Given the make options fixed costs and variable costs associated with transportation in the company should be considered. With the option of buy the size of the transport needs of the company and the rate of carriage from the outside should be taken into account. When setting the break-even point to the production (transportation) own and outside total costs (fixed and variable) are being compared. The total costs to purchase services from outside carrier is expressed with the following equation [4]:

$$KC_1 = P \cdot D \text{ [PLN]} \quad (1)$$

Total costs in carrying out internal (own) transportation are expressed with the following equation:

$$KC_2 = (V_j \cdot D) + FC \text{ [PLN]} \quad (2)$$

where:  $KC$  – total cost [PLN],  $P$  – shipping rate [PLN / km];  $D$  – transportation volume [km];  $V_j$  – unit variable cost [PLN / km],  $FC$  – fixed costs [PLN].

We express breakeven analysis by the comparison of the internal and from the outside transport costs:

$$\begin{aligned} KC_1 &= KC_2 \\ P \cdot D &= (V_j \cdot D) + FC \\ FC &= (P \cdot D) - (V_j \cdot D) \\ FC &= D \cdot (P - V_j) \\ D &= \frac{FC}{(P - V_j)} [km] \end{aligned} \quad (3)$$

Break-even point analysis (Fig. 2) is determined for a period of time, for example, for the month, semester, year, etc.

### 3. EXAMPLE OF MAKE OR BUY DECISION

A chosen company for the case study example is a production - service - trade entity engaged in the storage and transport of household chemicals founded in 1998 in Katowice. Transportation of goods takes place mainly among Silesia region of Poland. The recipients of the goods are hospitals, school and educational institutions, retail outlets etc. The company also provides transport services and sale of chemical products for individual customers. The company's board is rather small because it consists of two partners and employs 12 people. The rolling stock capital consists of four vans (Mercedes - Benz Sprinter I, two Volkswagen Transporters 1.9 TDI and Opel Combo 1.7). Technical support of those vehicles is carried out outside the company. The company uses the services of a single car workshop. Through a long cooperation it receives many discounts for services performed thus repair costs are reduced.

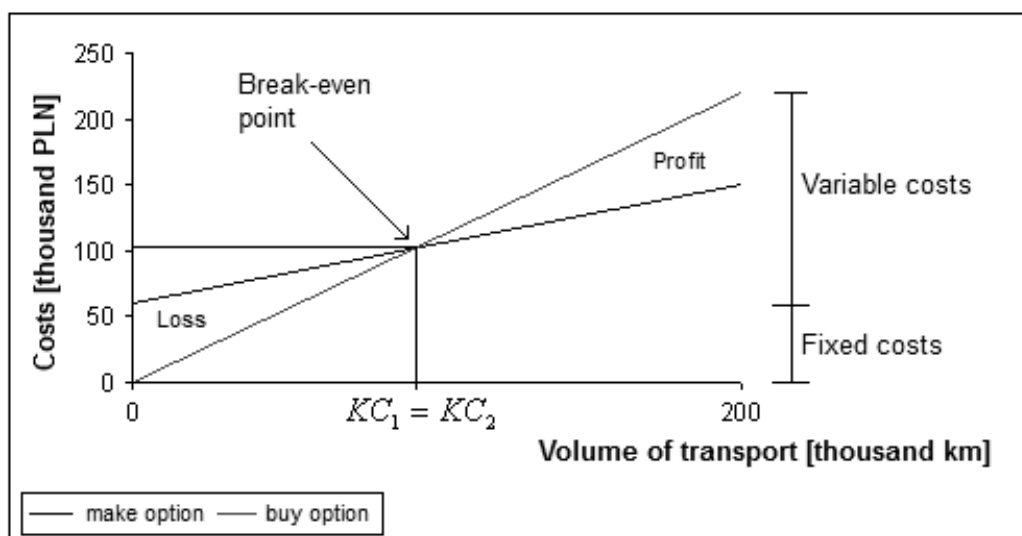


Fig. 2. Transport break-even point analysis  
Rys. 2. Analiza prognozy rentowności w transporcie

The company engaged in the production and drop distribution of chemical products, the possibility of giving up its own transport base is being considered. In order to help the managers to make a reasonable decision, Make or Buy analysis is being carried out. Total costs per 2012 year is about 124,865 PLN (Tab. 1). The cost of buying an external carrier is around 151,200 PLN (based on: [1]).

Table 1

Average costs for the company in 2012

Average costs [PLN]		
Total costs [PLN]	Fixed costs [PLN]	Variable costs [PLN]
124 865	16 371	108 494

Fixed costs (Table 2) are the part of the operating costs of the company, which does not change in the specified size range of transport. Fixed costs therefore have immutable value in each period. Variable costs (Table 2) are part of the total costs which are subject to changes in a particular area of transport activities in different periods of time.

Variable cost per unit [PLN/km] can be expressed by this equation:

$$V_j = \frac{V}{D} \text{ [PLN/km]} \quad (4)$$

where:  $D$  – size of transport work [km];  $V_j$  – variable cost per unit [PLN/km],  $V$  – total variable costs [PLN].

$$V_j = \frac{108494}{65000}; V_j = 1,70[\text{PLN/km}]$$

For calculating the break-even point [km] the (3) equation was used. Break-even analysis for the year 2012 is shown graphically in Fig. 3.

Table 2

Fixed and variable costs for the company in 2012

Fixed costs [PLN]		Variable costs [PLN]	
Depreciation of motor vehicles	5 628	Fuel costs	27 014
Taxes	5 943	Cost of consumables (oil, grease, etc.)	1 300
Research and development costs	1 500	Direct salaries (staff directly related to transport)	54 000
Costs of health and safety	800	Costs of tires	980
Bank services	250	The cost of maintenance and repair	7 200
Office supplies	1 500	Cost accounting of invoices relating to vehicles	6 000
Materials for general purposes	750	The cost of administration and management of transportation facilities	12 000
<i>Total fixed costs</i>	<b>16 371</b>	<i>Total variable costs</i>	<b>108 494</b>

$$D = \frac{FC}{(P - V_j)} ; D = 18190 [\text{km}]$$

$$D = \frac{16371}{(2,6 - 1,7)}$$

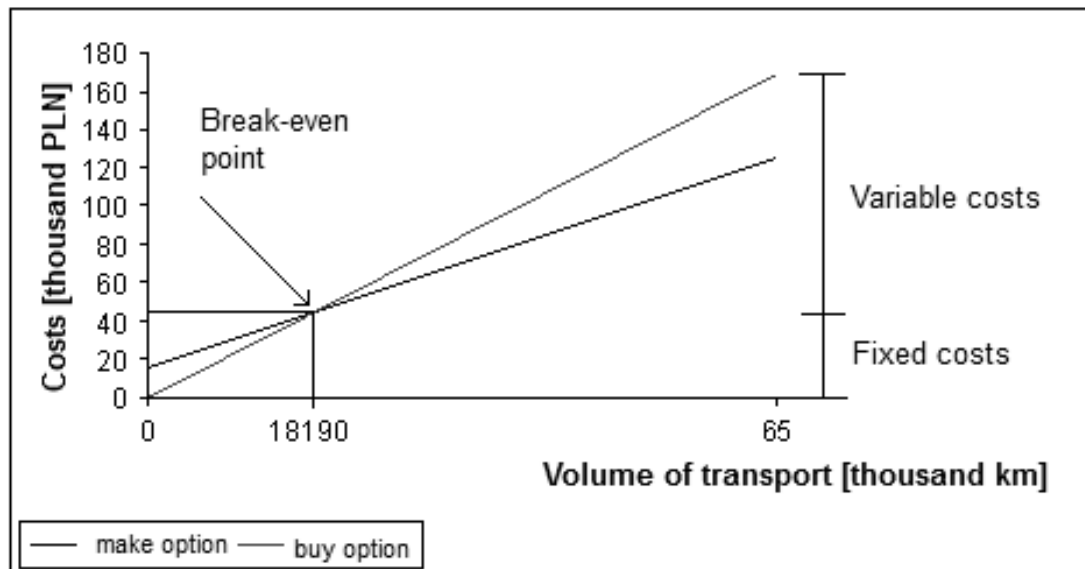


Fig. 3. Case study transport break-even point analysis

Rys. 3. Analiza prognozy rentowności w transporcie dla studium przypadku

An example of a break-even analysis showed that at the time (data form 2012) when the volume of transportation work exceeds 18 190 km per year, the company will not be profitable to maintain their own fleet, but it will be then more cost-effective to use an external carrier (to outsource transport).

Cost improvement, and thus efficiency is the main driver of customer loyalty when the outsourced services are simple and the contracting period relatively short. A clear shift of importance is observable when services increase in complexity and the contracting period lengthens [11].

However, it is recommended not to carry too hasty make or buy decision, as it should be based on a qualitative analysis of a whole scope covering a period of several years, and also supported by qualitative analysis.

#### 4. CONCLUSIONS

- a) Make or buy strategy used in the company comes down to both the investment analysis and the analysis of the benefits of the implementation of the selection strategy in the supply chain.
- b) Breakeven analysis is one of the qualitative methods to help managers make a make or buy decision – it shows that when the scale of the demand is higher, the higher the profitability of own transportation.
- c) According to case study, the use of external service will cease to be profitable over 18,190 kilometers transport goods per one year. Carriage volume is 65,000 km per year and therefore maintain their fleet is still more beneficial for the carrier.
- d) Fixed costs, which the company in 2012 amounted to PLN 16,371 per unit of transported goods. With increasing demand for transport fixed costs are expected to decrease while the variable costs amounting to 108,494 PLN will continue to rise with the increase in transport activity. A significant difference between these costs means that the company incurs costs primarily related to the operation and use of the rolling stock.

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