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VEHICLE SELECTION MODEL WITH RESPECT TO ECONOMIC ORDER QUANTITY

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Abstract: *The matter of vehicle selection, optimizing the order quantity or optimizing logistics costs is extensively discussed in both Polish and foreign literature. In numerous publications, the necessity of decision making in transport or in other related areas with respect to total logistics costs is addressed. Nevertheless, problems arising from the effect of vehicle selection on Economic Order Quantity (EOQ), while fully taking into account transport costs, fails to be mentioned. This paper presents a decision-making model for transport selection taking into consideration total logistics costs and a newly obtained formula for the economic order quantity which separates transport costs into fixed costs, variable costs dependent on the driving distance and operation time, as well as other variable costs. Analyses pertaining to the impact of cargo value and volumetric weight on vehicle selection and on Economic Order Quantity are also conducted.*

Key words: *vehicle selection, Economic Order Quantity, transport costs, logistics costs.*

1. Introduction

In many cases, vehicle selection of varying payload and load-carrying capacity for transport along a specific route, solely based on transport costs, results in flawed decisions. Despite the fact that a fully loaded vehicle with a larger capacity results in lower transport costs, larger and less frequent deliveries have an adverse impact on holding costs for both the supplier and customer. Hence, in order to solve the problem of vehicle selection, it is necessary to consider total logistics costs (Wasiak, 2016), or to assume that the order quantity to be transported in specific deliveries has been set (this does not result from vehicle selection)

Furthermore, many researchers have noted that transport costs are becoming increasingly important in decision making with regard to restocking, where, in practice, the delivery quantity has a significant effect on storage, transport, mode of transport, transport routes and technical limitations (Andriolo et al., 2014). As a consequence, the total logistics costs function is not convex over the entire range of order levels, but is a locally convex function. Research on this subject has been reported in Vroblefski et al. (2000), among others, where a generalized model for determining the optimum delivery quantity to particular logistics chain facilities, assuming several transport cost levels for various order quantities, was proposed. Meanwhile, the effect of transport costs (also described as an increment function dependent on delivery quantity), including potential discounts in total logistics costs, and optimal order quantity was described in Swenseth & Godfrey (2002). Solutions presented in Mendoza & Ventura (2008) pertaining to the delivery quantity and logistics costs, including the transport costs dependent on delivery quantity, were developed further to encompass the issue of discounts. Moreover, the authors in (Burwell et al., 1997) took into account the demand variability in relation to supply costs. Research that concerns optimization of order quantity based on total logistics costs also takes into consideration environmental aspects, including the impact of transport and warehouse facilities on external costs (Battini et al., 2014). In articles (Battini et al., 2014; Zaho et al., 2004), logistics costs also include stock aging costs and transport costs dependent on the mileage and labor.

On the other hand, it should be noted that the vehicle selection problem is only considered from the perspective of the transport process and neglects to take into account total logistic costs (Lissowska, 1975). At the same time, the significance of vehicle selection for transport assignment is emphasized, for the operator, shipper and receiver. The operator is focused on maximizing transport potential, minimizing shipment costs, avoiding cargo damage and considering shipment time and the associated costs. The shippers and receivers are concerned with shipment time, the related costs and avoiding cargo damage. Consequently, the basic criterion for vehicle selection is the cost of transport costs (Bogdanowicz, 2012; Jacyna, 2009a; Wasiak, 2011; Wasiak & Jacyna-Gołda, 2016). However, from the perspective of shippers and receivers, other logistics costs, which may change along with costs of transport, should also be considered.

A review of the literature shows that researchers who specialize in inventory management focus on optimizing the total logistics costs. However, in these methods, transport costs are either simplified or reflected as fixed and variable costs. It should be noted that such an approach to transport costs is often insufficient and erroneous (compare with Wasiak & Jacyna-Gołda, 2016). Additionally, in studies concerning logistics costs, the order quantity and transport costs are considered from the customer's perspective, and not the logistics service provider. In contrast to these approaches, this article and article (Wasiak, 2016) present an extension of the issues related to total logistic costs optimization by carefully considering costs of transport services[1] along with analyzing the effect of decisions about vehicle selection on total logistics costs. This article also presents comprehensive analyses on the impact of cargo value and weight on vehicle selection, as well as economic order quantity.

2. Determinants of vehicle selection for assignments

Numerous publications address the issue of optimizing the allocation of transport means and drivers to assignments (Carraresi & Gallo, 1984; Freling et al., 1999; Izdebski & Jacyna, 2012; Jacyna, 2009b; Kisielewski, 2007; Lourenço et al., 2001; Wasiak, 2011). The root of this problem lies with the assumption that the transport assignments, which are to be completed by a deadline, and the service provider's transport capacity is known. However, this article focuses on appropriately selecting means of transport for completing a given transport assignment. Mathematical relationships developed in a later section of the article may encourage the verification of models applied in order to allocate modes of transportation to assignments.

In each case, the main determinant in vehicle selection for specific assignments is transportability of the object (cargo or persons) and available resources (including vehicles) (Bogdanowicz, 2012).

The basic criteria for vehicle selection found in literature are as follows (Lissowska, 1975):

- cargo type and load quantity, including: its features and properties, technical susceptibility, spatial nature and the volume of load to be transported along a route,
- transport routes, which may determine vehicle selection of a certain overall weight, EURO standard or capacity of the fuel tank, or additional equipment necessary to outfit the vehicle cabin,
- available loading equipment and loading methods, which determine the application of a given vehicle based on the loading equipment operation (adaptation of parameters, for example, the floor durability and axle load of a forklift or the height of a forklift and the interior height of the vehicle),
- conditions at shipping and receiving sites, including:
  - access roads (pavement type, traffic organization – one- or two-way roads, road width, maximum axle loads),
  - entry gates (width, length),
  - maneuvering area (paving type, area, length, width),
  - parking area (width, length),
  - auxiliary loading equipment (carts, loading bridges, etc.),
  - loading ramps (height, purpose),
  - loading area (width),
  - loading height (difference between warehouse floor and height of the vehicle trailer),
  - distance over which the cargo is transported,
- vehicle mileage while completing a transport assignment, which is a function of the cargo quantity relative to the transport, as well as the payload capacity of the vehicle,
- duration of vehicle route time, which is comprised of the loading time, driving time (including time without cargo), unloading time and the time necessary to complete the delivery - acceptance protocol,

[1] Solutions pertaining to total transport costs and their components have been described in detail in (Wasiak & Jacyna-Gołda, 2016), and the recognition of transport costs in various types of transport cycles are presented, among others, in (Jacyna & Wasiak, 2015; Lewczuk & Wasiak, 2011 and Wasiak & Jacyna, 2015).

- forwarding costs, including the cost of vehicle operation, as defined by the relevant formula.

The first four criteria are selective technical and performance criteria, while the remaining three are comparative criteria. The selective criteria for each transport assignment always has to be updated and the information is complete. The remaining comparative criteria appear to lack detailed information. Only the incurred costs of the transport operator are considered in this process. Therefore, in order to come up with a complex solution for this logistics problem, it would be reasonable to also include the costs of shippers and receivers of transported goods.

3. Logistic costs versus transport costs

Logistics costs are defined as monetary consumption of human labor, tools and resources, financial expenses and other negative results of unexpected events that arise from warehousing material goods and their flow within and among companies (Skowronek & Sarjusz-Wolski, 2003). In nature, logistics costs not only include costs in the traditional understanding, but also so-called alternative costs, which are a generally accepted result of imperfections in a logistics system (accepted customer service level).

Taking into account the implementation stages of logistics processes, the following logistic costs can be highlighted (Wasiak & Jacyna-Gołda (2016) own study based on Bentkowska-Senator et al. (2011), Blaik (2001) and Krzyżaniak (2008)):

- flow management costs, including costs of designing and planning the flow of material goods, their management and control,
- warehouse costs (maintenance of the warehouse facility, inventory management), including costs of warehouse facility depreciation and equipping warehouses, employee labor in the warehouses, including overheads, warehouse rent, consumption of auxiliary materials during internal transport and storage, fuel and electric power, as well as maintenance and repairs,
- costs of external transport (outside and among facilities) including fixed costs of own-account transport, variable costs of own or external transport or intervention supplies and (potentially) costs of insurance and customs of the transported loads,
- costs of order placement and acceptance of deliveries, including fixed costs of the acquisition department (remuneration and related costs, premises usage costs, consumption of water, power etc.), variable order placement (documentation and information exchange), and special supply acceptance procedures (sampling and sample testing in laboratory),
- costs of preparing products for transport and sale, including the costs of packaging, labeling, handling and picking,
- production costs with respect to planning and control, supplying production lines and picking up the intermediate products and finished goods (including costs of internal transport in manufacturing facilities),
- insurance costs and losses associated with holding, including costs of wear and tear (caused by the loss of value in use of the inventory, and defects occurring naturally and created by technical progress), inventory insurance (for theft, fire, flooding and other disasters), theft and other losses,
- costs of financial flows,
- loss of profits costs, including financial costs – associated with frozen capital in inventory (frozen financial assets cannot be involved in other investments), loss of purchase discounts (the given order quantity results in a higher price), use of alternative materials caused by lack of inventory (including costs arising from offering lower quality products and loss of customers, necessity of selling goods at a discounted price or scrapping or throwing out goods of lower quality), production downtime, elimination of disturbances in the production process (including costs of resetting machines),loss of sales (connected with loss of customers or a limited number of transactions).

According to the list above, external transport costs are a significant component of logistics costs. Research shows that they constitute from 30% to 40% of total logistics costs (own calculation according to Blaik (2001)). In addition, the amount of transport costs is determined by the selected vehicle, including fuel consumption, loss of value, and employee remuneration. The result of selecting a more expensive transport in smaller quantities is more frequent deliveries, and, consequently, a smaller cyclical inventory maintained by the customer and receivers. It is undisputable that by selecting transport vehicles of varying load capacity, the transport costs, inventory management costs, ordering costs and costs of accepting deliveries will change.

4. Vehicle selection methods with regard to logistics costs

This section of the article examines the question of shipping specific material goods over a defined route. The annual demand for transport determined by the number of loading units or packaging units of a given type, (e.g. EURO pallet loading units, collective packaging) *J* and the weight of this load, *M* is a known factor. Moreover, the annual holding cost of this particular material good's load unit at its dispatch point, *kn* and at its destination point, *ko*, the cost associated with ordering and accepting delivery at the destination point, *kp*, as well as the loading time, (expressed in minutes) *tn* and the unloading time, *tr* of this loading unit has been determined. In addition, it was assumed that vehicle types which may be used to complete the analyzed transportation assignments $\boldsymbol{S} = \{1, \ldots, s, \ldots, S\}$ are known. For particular types of vehicles, we know the respective loading capacity, *p*(*s*) defined as the number of loading units or packaging units of a determined type, payload capacity, *q*(*s*) given in units of weight, as well as costs dependent on the distance, *kl*(*s*), costs dependent on working time, *kh*(*s*) and additional costs, *kd*(*s*).

The distance over which cargo is transported over the analyzed route, *L*, the coefficient of mileage, *B*, as well as technical speed of particular types of vehicles, *Vt*(*s*) and stoppage times, aside from cargo loading, in one transport cycle (e.g. associated with driver work breaks or cargo loading wait time) *tp*(*s*) is also known.

Considering the aforementioned information, the number of loading units that may be transported in a single transport cycle for vehicles of particular types may be determined in the following way:

$$J_{\max}(s) = \min\left\{ p(s); \left\lfloor \frac{J}{M} \cdot q(s) \right\rfloor \right\} \text{ (pcs./cycle)} \qquad (1)$$

However, it turns out that the premise of fully utilizing the transport vehicle's capacity is, in many cases, contrary to the economic interests of companies. This is due to the fact that the quantity of supplies has a direct impact on the amount of cyclical stocks, and as a consequence, on the cost of inventory management. Because of this, it is necessary to consider not only transport costs, but also costs of inventory management, ordering and accepting deliveries.

Denoting the actual quantity of the delivery as *J*(*s*), the transport cost (in Polish Zloty) for a single transport cycle based on the type of vehicle may be determined as follows:

$$kt(s) = kl(s) \cdot \frac{L}{B} + kh(s) \cdot \left[\frac{L}{B \cdot Vt(s)} + \right. \\ \left. + \frac{J(s) \cdot (tn + tr) + tp(s)}{60} \right] + kd(s) \text{ (PLN)} \qquad (2)$$

The variable holding cost and replenishment at the delivery location may be expressed in the following way:

$$KZo(s) = \frac{J \cdot (kp + kt(s))}{J(s)} + \frac{ko \cdot J(s)}{2} \text{ (PLN)} \qquad (3)$$

Substituting equation (2) into (3) and marking *J*(*s*) as *J′*(*s*), the following was obtained:

$$KZo(s) = \frac{J \cdot kp}{J'(s)} + \frac{J \cdot kl(s) \cdot L}{J'(s) \cdot B} + \\ + \frac{J \cdot kh(s) \cdot L}{J'(s) \cdot B \cdot Vt(s)} + \frac{J \cdot kh(s) \cdot (tn + tr)}{60} + \\ \frac{J \cdot kh(s) \cdot tp(s)}{J'(s) \cdot 60} + \frac{J \cdot kd(s)}{J'(s)} + \frac{ko \cdot J'(s)}{2} \text{ (PLN)} \qquad (4)$$

Then equation (4) was differentiated with respect to *J′*(*s*) and the obtained derivative was set equal to zero:

$$\frac{\partial KZo(s)}{\partial J'(s)} = -\frac{J \cdot kp}{J'(s)^2} - \frac{J \cdot kl(s) \cdot L}{J'(s)^2 \cdot B} + \\ -\frac{J \cdot kh(s) \cdot L}{J'(s)^2 \cdot B \cdot Vt(s)} + 0 + \\ -\frac{J \cdot kh(s) \cdot tp(s)}{J'(s)^2 \cdot 60} - \frac{J \cdot kd(s)}{J'(s)^2} + \frac{ko}{2} \qquad (5)$$

$$-\frac{J\cdot kp}{J'(s)^2}-\frac{J\cdot kl(s)\cdot L}{J'(s)^2\cdot B}-\frac{J\cdot kh(s)\cdot L}{J'(s)^2\cdot B\cdot Vt(s)}+ -\frac{J\cdot kh(s)\cdot tp(s)}{J'(s)^2\cdot 60}-\frac{J\cdot kd(s)}{J'(s)^2}+\frac{ko}{2}=0 \quad (6)$$

$$\frac{ko}{2}=\frac{J\cdot kp\cdot B\cdot Vt(s)\cdot 60}{J'(s)^2\cdot B\cdot Vt(s)\cdot 60}+ +\frac{J\cdot kl(s)\cdot L\cdot Vt(s)\cdot 60}{J'(s)^2\cdot B\cdot Vt(s)\cdot 60}+ +\frac{J\cdot kh(s)\cdot L\cdot 60}{J'(s)^2\cdot B\cdot Vt(s)\cdot 60}+ +\frac{J\cdot kh(s)\cdot tp(s)\cdot B\cdot Vt(s)}{J'(s)^2\cdot B\cdot Vt(s)\cdot 60}+ +\frac{J\cdot kd(s)\cdot B\cdot Vt(s)\cdot 60}{J'(s)^2\cdot B\cdot Vt(s)\cdot 60} \quad (7)$$

$$J'(s)^2\cdot B\cdot Vt(s)\cdot 60\cdot ko=2\cdot J\cdot \cdot\left[Vt(s)\cdot 60\cdot\left(kp\cdot B+kl(s)\cdot L+kd(s)\cdot B\right)+ +kh(s)\cdot L\cdot 60+kh(s)\cdot tp(s)\cdot B\cdot Vt(s)\right] \quad (8)$$

$$J'(s)=\sqrt{\frac{2\cdot J}{ko}\cdot\left[kp+kl(s)\cdot\frac{L}{B}+ +kh(s)\cdot\left[\frac{L}{B\cdot Vt(s)}+\frac{tp(s)}{60}\right]+kd(s)\right]} \quad (9)$$

Comparing equation (9) to the Wilson-Harris equation, it can be seen that the cost index of inventory replenishment has been expanded as follows:

$$kp+kl(s)\frac{L}{B}+kh(s)\left[\frac{L}{B\cdot Vt(s)}+\frac{tp(s)}{60}\right]+kd(s) \quad (10)$$

Importantly, if the cost index of ordering and accepting delivery at the delivery point, *kp*, is omitted, equation (10) will not be identical to the transport cost defined by formula (2).
The optimum quantity of supplies, $J'(s)$, with the interests of the receiver in mind, is obtained by taking into account means of transport of a given capacity. Hence, the minimum value of J(s) should be chosen from $J_{max}(s)$ and $J'(s)$, as shown below:

$$J(s)=\min\left\{J_{max}(s),J'(s)\right\} \quad (11)$$

Next, the number of transport cycles for vehicles of certain types is expressed as follows:

$$N(s)=\frac{J}{J(s)}\ \text{(cycles)} \quad (12)$$

Equation (12) shows that the number of forwarding cycles in a certain period, for example, one year, does not have to be a whole value. In a case like this, the incomplete delivery from a given period shall be completed by the demand from the next period.
The total vehicle mileage, the route time and the cost of transport assignment completion on a given route for vehicles of particular types was formulated as follows:

$$L(s)=\frac{L}{B}\cdot N(s)\ \text{(km)} \quad (13)$$

$$T(s)=\frac{L(s)}{Vt(s)}+\frac{J\cdot(tn+tr)+tp(s)\cdot N(s)}{60}\ \text{(h)} \quad (14)$$

$$KT(s)=kl(s)\cdot L(s)+kh(s)\cdot T(s)+ +kd(s)\cdot N(s)\ \text{(PLN)} \quad (15)$$

Substituting equations (12), (13) and (14) into (15), the following equation was obtained for the total cost of transport in the analyzed mathematical relationship:

$$KT(s)=\left[kl(s)+\frac{kh(s)}{Vt(s)}\right]\cdot\frac{L\cdot J}{B\cdot J(s)}+ +kh(s)\cdot\frac{tn+tr}{60}\cdot J+ +\left[kh(s)\cdot\frac{tp(s)}{60}+kd(s)\right]\cdot\frac{J}{J(s)}\ \text{(PLN)} \quad (16)$$

From total logistics costs, the following costs, which are dependent on the delivery quantity and transport costs, have been identified below:
- variable costs of cyclical holding by the shipper, *KUn*(*s*),
- variable costs of cyclical holding by the receiver, *KUo*(*s*),

- variable costs of ordering and accepting deliveries by the receiver, $KP(s)$.

These costs have been formally expressed as follows:

$$KUn(s)=\frac{kn\cdot J(s)}{2}\ \text{(PLN)} \quad (17)$$

$$KUo(s)=\frac{ko\cdot J(s)}{2}\ \text{(PLN)} \quad (18)$$

$$KP(s)=\frac{J\cdot kp}{J(s)}\ \text{(PLN)} \quad (19)$$

Resulting from this analysis, logistics costs which should be calculated for the selection of appropriate vehicles are expressed in the following equation:

$$KL(s)=KUn(s)+KUo(s)+KP(s)+ +KT(s) \ \text{(PLN)} \quad (20)$$

Using the defined equations (16)–(19), the following formula was obtained for calculating logistic costs dependent on vehicle selection:

$$KL(s)=(kn+ko)\cdot\frac{J(s)}{2}+ \left[kl(s)+\frac{kh(s)}{Vt(s)}\right]\cdot\frac{L\cdot J}{B\cdot J(s)}+ +kh(s)\cdot\frac{tn+tr}{60}\cdot J+\frac{J}{J(s)}\cdot \cdot\left[kh(s)\cdot\frac{tp(s)}{60}+kd(s)+kp\right]\ \text{(PLN)} \quad (21)$$

5. Case study

The significance of the vehicle selection method for transport assignment presented in this article is demonstrated using an example of transporting four types of material goods: low volumetric weight highly processed goods, low volumetric weight low processed goods, high volumetric weight highly processed goods and high volumetric weight low processed goods.

The value of a pallet loading unit of low volumetric weight and highly processed goods amounts to about 75 355 PLN, a unit of low volumetric weight low processed goods amounts to about 258 PLN, a unit of high volumetric weight highly processed goods amounts to 106 512 PLN, while the value of pallet load unit of high volumetric weight low processed goods was estimated at 369 PLN.

The gross weight of a pallet loading unit containing the first type of goods was estimated as 0.153 t, with the second type of goods – at 0.050 t, with the third type of goods – at 0.700 t, and the gross weight of pallet loading unit with the fourth type of goods – at 1.428 t. It is clear that the selected material goods significantly differ by value and volumetric weight.

The coefficient of annual inventory holding costs was applied at the dispatch point and delivery point in the amount of 25% and the cost of ordering and accepting delivery, regardless of quantity, was added in the amount of 160 PLN. The loading time at the dispatch point and unloading time at the delivery point was assumed to be 2 minutes each.

The quantity of transported cargo was 500 pallet load units /year, the distance of cargo transport was 100 km, and the coefficient of vehicle mileage was 0.85.

Four types of vehicles with various characteristic features were selected and listed in Table 1 for transport assignment completion.

The logistics costs sensitive to vehicle selection were obtained for each type of material good. These costs, along with calculated transport costs assuming full exploitation of the vehicle, are presented in Figure 1.

As shown in Figure 1a, relatively expensive cargo of low volumetric weight should be transported by vehicles with low capacity, for which the transport cost is higher at full capacity. The economic order quantity for this material good allows for utilizing 25% capacity of the average tonnage truck, 19% capacity of the high tonnage truck, 15% capacity of the semi-trailer truck and 13% capacity of the truck with a trailer. It is similar in the case of expensive cargo of high volumetric weight (Figure 1c), however, in this particular case, the economic order quantity for this material good allows for utilizing 29%, 16%, 12% and 11% of vehicle capacity, respectively.

Table 1. Characteristic Features of Selected Vehicle Types

Type of feature	Unit	Marking	Average tonnage truck (s = 1)	High tonnage truck (s = 2)	Semi-trailer truck (s = 3)	Truck with trailer (s = 4)
Vehicle payload capacity given in number of load units	pcs.	$p(s)$	16	26	33	39
Load-carrying capacity of a vehicle given in fixed weight units	tonnes	$q(s)$	10.00	17.60	25.30	26.15
Costs dependent on distance	PLN/km	$kl(s)$	0.8840	1.1492	1.4144	1.4144
Costs dependent on operating time	PLN/h	$kh(s)$	18	20	22	23
Additional costs	PLN/cycle	$kd(s)$	40	100	100	100
Technical speed of vehicle	km/h	$Vt(s)$	45	43	42	42
Time of breaks beyond working in the break cycle	min	$tp(s)$	55	55	55	55

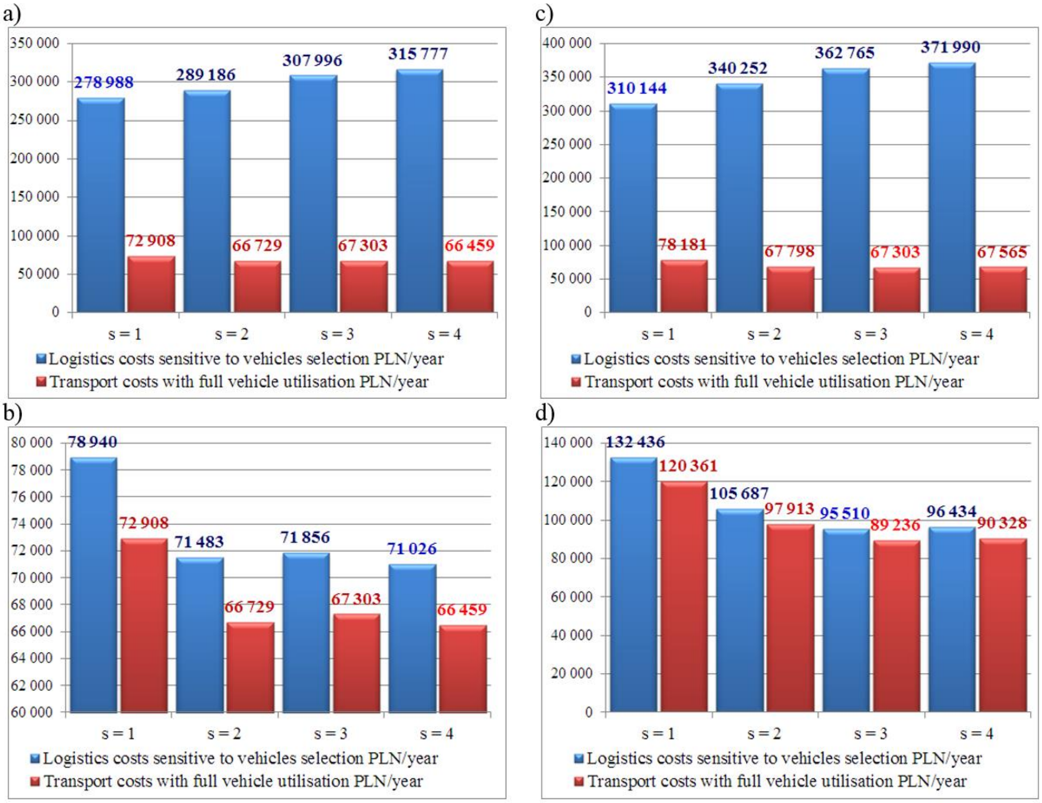

Fig. 1. Logistics costs and transport costs in classical formulation for cargo transport:
a) of low weight and high value, b) of low weight and low value,
c) of high weight and high value, d) of high weight and low value

In the case of low value cargo with low volumetric weight (Figure 1b), and low value cargo with high volumetric weight (Figure 1d), the situation is different. Due to logistics costs, as well as transport costs, it is most cost-effective to select vehicles with larger payload and load-carrying capacity. For cargo with low volumetric weight, the best option is to select a truck with a trailer (s=4), and for cargo with high volumetric weight semi-trailer trucks (s=3) should be selected. It is important to note that the economic order quantity for both types of cargo allows for the full utilization of vehicle capacity.

The results of the conducted analysis are presented in Table 2. As we can see, of the two parameters considered (volumetric mass and value), the value of cargo is more significant in vehicle selection than the volumetric weight of cargo, as determined by the economic order quantity. On the other hand, the volumetric weight of cargo plays an important role in the selection of standard or high payload and load-carrying capacity vehicles.

6. Conclusions

The issue of vehicle selection for the needs of transport assignments is of particular importance. Aside from ensuring appropriate transport conditions, vehicle selection significantly affects transport costs and other logistics costs dependent on the selected vehicle capacity. Such logistics costs include inventory management costs, ordering and accepting deliveries. Therefore, flawed decisions may be made when only considering transport costs. The approach presented in this article uses an original formula to determine the economic order quantity, which was derived by taking into account ordering costs, inventory management costs, and costs of transport, which include costs dependent on mileage, route completion time, and other direct costs (such as road tolls).

The conducted analyses indicate that the value of cargo plays a significant role in the selection of vehicle capacity for transport over a certain route. In the case of low value cargo, based on total logistics costs, it is cost efficient to select vehicles with high load-carrying and payload capacity. However, in the case of high value cargo it is cost efficient to choose lower capacity vehicles. Moreover, cargo loads with a high economic order quantity do not economically justify the full utilization of a transport vehicle.

Furthermore, this analysis shows that due to the specific nature of transport costs, when considering transport service costs, the economic order quantity formula may produce misleading solutions.

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Table 2. Value and weight of load and vehicle selection and usage of its load-carrying capacity

Load weight / Load value	Low	High
Low	Vehicle with a high load-carrying capacity and increased payload capacity (s = 4) used in 100% with respect to its payload capacity	Vehicle with a high load-carrying capacity and payload capacity (s = 3) used in 100% with respect to its payload capacity
High	Vehicle with a low load carrying capacity and payload capacity (s = 1) used in 25% with respect to its payload capacity	Vehicle with a low load carrying capacity and payload capacity (s = 1) used in 29% with respect to its payload capacity

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