METHOD OF SELECTION OF THE CARRIER IN ROAD TRANSPORT

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Abstract: In the article an algorithm of the carrier of selection in road transport with a selection of indicators (criteria) assessment, their ranking and the weight calculation, the definition of the rating of the carrier is offered.

Key words: road transport, transportation, freight forwarding, carrier selection criteria, algorithm, rank method

Introduction

The situation of selection of the carrier often arises at the enterprises and the organizations of passengers planning transportation under orders. The analysis of methods of selection of the carrier are stated in Lenka Černá, Vladislav Zitrický, Jozef Daniš, Mary J. Meixell, Mario Norbis and L.B.Mirotina works [1,2,3]. In modern conditions, the most widespread rank methods [4]. The choice of suitable alternative, in such methods, is carried out on the basis of calculation of a complex rating. As a rule, the greatest attention at use rank methods give to algorithm of calculation of a rating. While not less important questions are calculation of relative scales of criteria, definition of a scale of measurement of degree of presence of the property estimated by given criterion [5]. The given questions should be studied and considered at use of the logistical approach to management of transportation of passengers under orders. In questions of a choice of a carrier widely apply expert methods as one of convenient and operative sources of the information, well adapted for poorly structured problems.

Usually at the carrier selecting use specially developed systems ranked indicators. As an example we will consider system for two carriers A and B on indicators (criteria) presented in Table 1 [1].

The weight of each criterion w_i is calculated by the formula [4]:

$$w_i = \frac{2 \cdot (N - I + 1)}{N \cdot (N + 1)}, \quad (1)$$

where N - quantity of considered indicators; I - a rank appropriated to i-th indicator.

Table 1. The criteria for the carrier selection

№	Indicator (criterion)	Rank	Weight, w_i	Carrier	
				A (a_{i1})	B (a_{i2})
1	2	3	4	5	6
1	Reliability of delivery time (transit)*	1	0.118	0.87	0.86
2	Tariffs (costs) of transportation, MU / km	2	0.11	0.84	0.75
3	Total delivery time (transit)**, %	3	0.103	10	15
4	Readiness (flexibility) of the carrier for negotiations on a tariff change	4	0.096	Well	Very well
5	Financial stability of carrier***	5	0.088	7	8
6	Presence of additional cargo handling equipment	6	0.081	Satisfactorily	Satisfactorily
7	Presence of additional services in the complete set and cargo delivery	7	0.073	Well	Very well
8	Safety of cargo (losses, plunder)	8	0.066	10	9
9	Freight forwarding of cargoes	9	0.059	8	7
10	Qualification of the personnel	10	0.052	8	9
11	Monitoring of transportations	11	0.044	10	8
12	Readiness (flexibility) of the carrier for service change	12	0.037	Satisfactorily	Well
13	Flexibility of routes	13	0.029	Very well	Well
14	Package service	14	0.022	8	8
15	Quality of the organisation of sales of transport services	16	0.015	Well	Very well
16	Special equipment	17	0.007	7	7

* Probability of delivery “it is exact in time”.
** Possibility of the deviation from planned duration of transportation, %.
*** Estimation on a 10-mark scale.
**** The Share of losses (plunders) from total amount of transportations.
***** Quantity of days between the order and transportation, day.
****** Share of failures of deliveries of vehicles in volume of demands [6].

Part of the selected indicators for which the assessment is carried out are qualitative, another part is quantitative. Qualitative assessments correlate with a five-point system: excellent - 5; very well - 4; well - 3; satisfactory - 2, unsatisfactory - 1. Quantity indicators basically are estimated by likelihood values, in percentage, on a 10-mark scale, volume of transportations, quantity of days of transportation etc [7].

By means of an integrated estimation, we will define the most comprehensible carrier.

For definition of values of indicators of carriers we will enter concepts reference value, i.e. the maximum or minimum value of an indicator on all carriers then values of indicators for carriers can be defined dependence:

$$b_{ij} = \begin{cases} w_i \dfrac{a_{ij}}{e_i} & at\ the\ \max\ e_i \\ w_i \dfrac{e_i}{a_{ij}} & at\ the\ \min\ e_i \end{cases} \quad (2)$$

where a_{ij} - current value of an indicator (an index i) a corresponding carrier (an index j), e_i - reference value of an indicator.

Let's calculate quantitative estimations. For an indicator № 1 "Reliability of time of delivery (transit)" under the formula (1) we define weight – 0.118. According to Table 1 it is defined reference value of an indicator, i.e. the maximum value – 0.87. Further using expression for max e_i dependences (2), we calculate value of a considered indicator for each carrier:

$b_{11} = 0.118 \cdot \dfrac{0.87}{0.87} = 0.118$ for carrier A, and $b_{12} = 0.118 \cdot \dfrac{0.86}{0.87} = 0.117$ for carrier B.

The calculated data on other indicators are summarized in Table 2.

Table 2. Calculation of quantitative estimates

№	Indicator	Weight, w_i	Reference value (e_i)	Carrier	
				A (b_{i1})	B (b_{i2})
1	Reliability of delivery time (transit)	0.118	0.87; max	1*0.118=0,118	0.86/0.87*0.118=0.117
2	Tariffs (costs) of transportation, MU / km	0.11	0.75; min	0.75/0.84*0.11= 0.098	1*0.11=0.11
3	Total delivery time (transit), %	0.103	10; min	1*0.103=0.103	10/15*0.103= 0.069
4	Financial stability of carrier	0.088	8; max	7/8*0.088=0.077	1*0.088=0.088
5	Safety of cargo (losses, plunder)	0.066	10; max	1*0.066=0,066	9/10*0.066=0,059
6	Freight forwarding of cargoes	0.059	8; max	1*0.059=0.059	7/8*0.059=0.052
7	Qualification of the personnel	0.052	9; max	8/9*0.052=0.046	1*0.052=0.052
8	Monitoring of transportations	0.044	10; max	1*0.044=0.044	8/10*0.044=0.035
9	Package service	0.022	8; max	1*0,022=0,022	1*0.022=0.022
10	Special equipment	0.007	7; max	1*0,007=0,007	1*0.006=0.007
	Total quantitative estimation with the account w_i	-		0.640	0.611

The results of the calculation of quality indicators are summarized in Table 3.

Table 3. Calculation of qualitative estimates

№	Indicator	Weight, w_i	Reference value (e_i)	Carrier	
				A (b_{i1})	B (b_{i2})
1	Readiness (flexibility) of the carrier for negotiations on a tariff change	0.096	4; max	3/4*0.096=0.062	1*0.096=0.096
2	Presence of additional cargo handling equipment	0.081	2; max	1*0.081=0.081	1*0.081=0.081
3	Presence of additional services in the complete set and cargo delivery	0.073	4; max	3/4*0.073=0.055	1*0.073=0.073
4	Readiness (flexibility) of the carrier for service change	0.037	3; max	2/3*0.037=0.025	1*0.037=0.037
5	Flexibility of routes	0.029	4; max	1*0.029=0.029	3/4*0.029=0.022
6	Quality of the organisation of sales of transport services	0.015	4; max	3/4*0.015=0.011	1*0.015=0.015
	Total qualitative estimation with the account w_i	-		0.263	0.324

The integrated estimation or carrier rating is defined by summation total quantitative and quality estimates of indicators (See Table 4).

Table 4. The integrated estimation or carrier rating

Indicator	Carrier	
	A (b_{i1})	B (b_{i2})
Total quantitative estimation	0.640	0.611
Total qualitative estimation	0.263	0.324
The integrated estimation or rating	0.903	0.935

Based on the comparison, the carrier with the highest rating is selected, that is, carrier .

Thus, for carrier selection it is offered to use the following algorithm:

1. Estimation indicators get out, and it is made their rankings;
2. Under the formula (1) the weight of each indicator is defined;
3. The selected indicators are divided quantitative and qualitative;
4. Under the formula (2) calculation of values of indicators is carried out;
5. Total quantitative and quality estimates of indicators are spent;
6. The rating of each carrier by addition quantitative and quality estimates is defined;
7. The carrier having the greatest rating gets out.

The given technique is recommended logistician, to the forwarding agent at the carrier selection.

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