OPTIMAL ROAD ROUTE SELECTION CRITERIA SYSTEM
FOR OVERSIZE GOODS TRANSPORTATION

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Abstract. The criteria system described in this paper is suitable to be used for planning and designing oversize or heavyweight cargo transportations routes. This system gives the possibility to choose objectively the most suitable sections of the route in existing road network. Also it is a means to compare various routes in the same certain territory allowing objectively selecting the best one according the certain criteria. The paper indicates that criteria system is an efficient mean for comparing the existing heavyweight and oversize cargo transportation routes for various modes of transport with alternatives of building new ones or building/redesigning some parts of the route.

Keywords: super heavy and oversize cargo, transportation, road safety, criteria.

1. Introduction

Oversize and heavyweight cargoes are usually transported using multimodal transportation way. It depends on the place where such cargoes are produced and where they should be used. The route for carrying oversize and heavyweight cargo is usually evaluated and designed individually. For this reason transportation process of oversize and heavyweight cargo becomes a problem, because investments for upgrading road transport infrastructure comprise a comparatively big part of the total project cost. Therefore, it is necessary to create criteria system as an instrument which allows evaluating sections of the route or the whole route for heavyweight and oversize cargo transportation. The system gives the possibility to choose objectively the most suitable sections of the route in existing road network.

The task of transport decision makers is to find the key for suitable transport development and reduction of a negative transport impact (Jakimavičius, Burinskienė 2007; Mačiulis *et al.* 2009). The existing conditions are investigated and received results are evaluated by accident prediction models (Akgüngör, Doğan 2009). The term "the most suitable" means the best compromise between the least time costs (time terms for preparation of the route and cargo transportation) and the least expenses (sums of direct costs of transportation, including expenses for preparation of special route and vehicle for transportation, legal expenses for permissions, local charges etc.). The use of modern technologies is becoming more and more prior. Few major technology changes have a significant impact on logistics activities: wide application of multimodal cargo transportation, implementation of modern applied information technologies (Batarlienė, Baublys 2007).

Some authors introduced main training needs and problems in the logistics as the main driving motive for learning and training process organization (Palšaitis, Bazaras 2007).

2. Development of transport market in the Baltic Sea Region and safety issues

It is important to note that transport market development in the Baltic Sea Region is uneven and depends on global changes in the world's economy situation. Market increase in 2000 was changed by a more depressive situation after 2008 crisis. It is possible to make some assumptions that in non-favourable situation it is possible to confront with traffic safety issues related with the ambition to increase profitability of transport companies for the account of safety. By authors Tikkakoski and Solakivi (2011) from Turku University (Finland), owing to the global financial crisis in 2008, freight volumes plunged by 16% in terms of ton-kilometers transported by road in the European Union (EU). Respectively, the international transport of goods and cabotage in the Baltic Sea Region decreased by 21.5% between 2008 and 2009. As a result, the oversupply of freight transport service providers is also endorsed by the figures revealed by the European Automobile Manufacturers' Association which confirmed that the registration of new European heavy commercial vehicles declined by 48% in 2009. Medium-sized companies have

either expanded their fleet or exited the market. Price being the driving factor of competition, large companies have increasingly outsourced physical distribution of goods to those subcontractors which accepted assignments at a lowest cost. Surveys have revealed that subcontracting and price competition may lead to negligence in the compliance with traffic safety and security. The level of traffic safety measured by accidents per ton-km reveals that safety has improved after the membership of Baltic States in the EU in 2004 and the financial crisis. However, both practitioners and authorities agree that the level of enforcement is not necessarily appropriate. Therefore the cooperation and harmonization of competent authorities should be ranked high on the agenda of traffic safety and security initiatives (Tikkakoski, Solakivi 2011).

Scientific research and publication of the different authors suppose attitude that transport system is very complicated and related with different fields of influence – economical, technical political and technological. Big amount of different contradictory interests and impact points must be formalized for estimation and operations purposes. For this task authors are suggesting multi-criteria approach for estimation and selection of road transport route for oversize and heavyweight cargoes transportation.

3. Multi-criteria approach for decision making in complicated environment for selection of an optimal solution

The selection of most suitable route for oversize and heavyweight cargo transportation is a complex task. Variety of factors influencing the success of transportation has different basis, therefore, it is not easy to join them to the unified system (Lamiraux *et al.* 2005; Rodrigue *et al.* 2009). The successful and effective application of multi-criteria approach for solving construction design problems is presented in the paper written by author Antuchevičienė *et al.* (2006). Rational construction management variants are usually selected under various conditions using the efficiency criteria. A choice of rational alternatives can be absolutely uncertain when influence of external factors is unknown (Antuchevičienė *et al.* 2006). Fuzzy multi-criteria decision making techniques are appropriate tools to prioritize under sophisticated environment (Fouladgar *et al.* 2011). Different multiple objectives are expressed in different units which make optimization difficult. Therefore, the internal mechanical solution of a Ratio System, producing dimensionless numbers, is preferred to Weights which are most of the time used to compare the different units (Brauers, Zavadskas 2011; Ginevičius, Podvezko 2007). Multi-criteria system for choosing the route for oversize and heavyweight cargo transportation could be used.

The most important factor affecting the quality of transportation heavy goods is safety, security and reliability. Risk evaluation and management is one of the key issues during the planning of oversize and heavyweight cargo safe transportation and investments into transport infrastructure reconstruction (Palšaitis, Petraška 2011;

Parentela, Cheema 2002). A one more successful application is presented by Vladimir Rykov who is analyzing reliability, safety and risk control and their management. Suggested methods are effective and could be applied for calculating the risk value of oversize and heavyweight cargo transportation process in selected route segments or the whole route as well (Rikov 2011).

Relationship between the features of longer combination vehicles and road safety issues are analyzed by Grislis (2010). Longer combination vehicles are unlawful in the major part of countries though some of them have allowed cargo haulage by longer combination vehicle in defined geographic regions or on designated roads. The author explores relationships between the technical features of longer combination vehicle, driver training and traffic safety issues. Longer combination vehicle as well as oversize and heavyweight transportation unit comparing to conventional large trucks have disadvantages, because design of some elements of road infrastructure is not fully suitable. Narrow traffic lanes, limited radius of curves can cause the increased risk of infrastructure and vehicle damage (Grislis 2010).

Evaluation of risk must be involved into the criteria system which allows choosing the optimal route for oversize and heavyweight cargo transportation.

4. Assessment of different transportation route selection factors

Different variable parameters in the beginning of the transportation process will be indicated by X_1, X_2, ..., X_n; parameters determining the transportation process in progress will be indicated by Z_1, Z_2, ..., Z_m, and variable parameters of the exit from the transportation process will be indicated by Y_1, Y_2, ..., Y_s (Fig. 1). Then, initial random quantities marked by X_1, X_2, ..., X_n will be analysed as components of the random vector X, the random quantities Z_1, Z_2, ..., Z_m – as components of the random vector Z and the exit random quantities Y_1, Y_2, ..., Y_s – as components of the random vector Y.

It is not possible to limit the authors of the article only to the analysis of separate initial and variable factors, characterising the quality of the transportation process in progress, because they are insufficient for obtaining comprehensive characteristics of the technical-economical indices of the transportation process; also because it is impossible to define the optimal variant of the transportation process management. The transportation process should be analysed as a multi-measurable
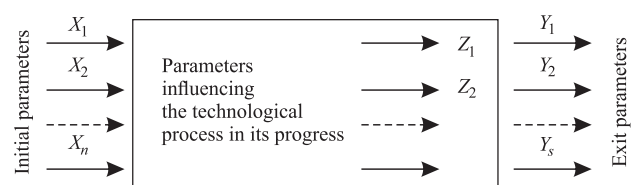

Fig. 1. Scheme of the technological transportation process

process with a large number of initial parameters, the general assessment of which allows a complex evaluation of the efficiency of functioning of the technological transportation process.

It is obvious that according to the characteristics of the multi-measurable process, the meanings of every exit variable Y should be defined. However, the exit variables of the multi-measurable process may be independent, correlated or connected by their functional interdependence. In practical terms, the characteristics of the transportation process should be analysed in each of the aforementioned cases. At the beginning the characteristics should be analysed of the transportation process, when the initial variables Y_1, Y_2, ..., Y_s are interdependent.

It should be presumed that general probability density of the vectored random quantities X, Z and Y is normal

$$\varphi_t (U_1,...,U_t) = \frac{1}{\sigma_{u_1},...,\sigma_{u_t} \sqrt{(2\Pi)^t E}} \times$$
$$\exp\left\{\frac{-1}{2E}\sum_{\mu,\nu=1}^{t} E_{\mu,\nu}\left(\frac{U_\mu - M\{U_\mu\}}{\sigma_{u\mu}}\right)\left(\frac{U_\nu - M\{U_\nu\}}{\sigma_{u\nu}}\right)\right\}, \quad (1)$$

where for the sake of abridgement the random vector quantity U is introduced which is made of X_1, ..., X_n, Z_1, ..., Z_m, Y_1, ..., Y_s; $t = n + m + s$; E – determinant of series t.

$$E = \begin{vmatrix} 1 & \rho_{u_1 u_2} & \cdots & \rho_{u_1 u_t} \\ \rho_{u_2 u_1} & 1 & \cdots & \rho_{u_2 u_t} \\ \cdots & \cdots & \cdots & \cdots \\ \rho_{u,u_1} & \rho_{u,u_2} & \cdots & 1 \end{vmatrix}, \quad (2)$$

or X, Z, Y in the variables' marking

$$E =$$
$$\begin{vmatrix} 1 & \rho_{x_1 x_2} & \cdots & \rho_{x_1 x_n} & \rho_{x_1 z_1} & \cdots & \rho_{x_1 z_m} & \rho_{x_1 y_1} & \cdots & \rho_{x_1 y_s} \\ \rho_{x_n x_1} & \rho_{x_n x_2} & \cdots & 1 & \rho_{x_n z_1} & \cdots & \rho_{x_n z_m} & \rho_{x_n y_1} & \cdots & \rho_{x_n y_s} \\ \rho_{z_1 x_1} & \rho_{z_1 x_2} & \cdots & \rho_{z_1 x_n} & 1 & \cdots & \rho_{z_1 z_m} & \rho_{z_1 y_1} & \cdots & \rho_{z_1 y_s} \\ \cdots & \cdots & \cdots & \cdots & \cdots & \cdots & \cdots & \cdots & \cdots & \cdots \\ \rho_{z_m x_1} & \rho_{z_m x_2} & \cdots & \rho_{z_m x_n} & \rho_{z_m z_1} & \cdots & 1 & \rho_{z_m y_1} & \cdots & \rho_{z_m y_s} \\ \rho_{y_1 x_1} & \rho_{y_1 x_2} & \cdots & \rho_{y_1 x_n} & \rho_{y_1 z_1} & \cdots & \rho_{y_1 z_m} & 1 & \cdots & \rho_{y_1 y_s} \\ \cdots & \cdots & \cdots & \cdots & \cdots & \cdots & \cdots & \cdots & \cdots & \cdots \\ \rho_{y_s x_1} & \rho_{y_s x_s} & \cdots & \rho_{y_s x_n} & \rho_{y_s z_1} & \cdots & \rho_{y_s z_m} & \rho_{y_s y_1} & \cdots & 1 \end{vmatrix}, \quad (3)$$

where $E_{\mu\nu}$ – an algebraic supplement $\rho_{umn\nu}$ in the determinant (2).

To analyse the case when the exit variables are independent, it is necessary to determine the characteristics of every variable Y_k ($k = 1, 2, ..., s$) as well as the influence exercised on them by the initial variables X and the variables

Z, characterising the inner state of the process (Baublys 2003). The general probabilities are X, Z and Y density $Y_{n+m+1}(Y_k, X_1, ..., X_n, Z_1, ..., Z_m)$, whereas the random vectored quantities' X and Z by the general probability density $\varphi_{n+m}(X_1, ..., X_n, Z_1, ..., Z_m)$. The probability densities $\varphi_{n+m+1}(\varphi_k, X_1, ..., X_n, Z_1, ..., Z_m)$ and $\varphi_{n+m}(X_1, ..., X_n, Z_1, ..., Z_m)$ are not zero ones and they correspond to the Eq (1) with determinants' σ and F meanings correspondingly of $(n + m + 1)$, and the $(n + m)$ series

$$\sigma = \begin{vmatrix} 1 & \rho_{x_1 x_2} & \cdots & \rho_{x_1 z_m} & \rho_{x_1 y_k} \\ \rho_{x_2 x_1} & 1 & \cdots & \rho_{x_2 z_m} & \rho_{x_2 y_k} \\ \cdots & \cdots & \cdots & \cdots & \cdots \\ \rho_{z_m x_1} & \rho_{z_m x_2} & \cdots & 1 & \rho_{z_m y_k} \\ \rho_{y_k x_1} & \rho_{y_k x_2} & \cdots & \rho_{y_k z_m} & 1 \end{vmatrix}; \quad (4)$$

$$F = \begin{vmatrix} 1 & \rho_{x_1 x_2} & \cdots & \rho_{x_1 x_n} & \rho_{x_1 z_1} & \cdots & \rho_{x_1 z_m} \\ \cdots & \cdots & \cdots & \cdots & \cdots & \cdots & \cdots \\ \rho_{x_n x_1} & \rho_{x_n x_2} & \cdots & 1 & \rho_{x_n z_1} & \cdots & \rho_{x_n z_m} \\ \rho_{z_1 x_1} & \rho_{z_1 x_2} & \cdots & \rho_{z_1 x_n} & 1 & \cdots & \rho_{z_1 z_m} \\ \cdots & \cdots & \cdots & \cdots & \cdots & \cdots & \cdots \\ \rho_{z_m x_1} & \rho_{z_n x_2} & \cdots & \rho_{z_m x_n} & \rho_{z_m z_1} & \cdots & 1 \end{vmatrix}. \quad (5)$$

A general characteristic of the technological transportation process is the conditional probability density $\varphi\left(\dfrac{Y_k}{(X_1, ..., X_n, Z_1, ..., Z_m)}\right)$ according to which the meaning may be defined by the general characteristics of the prior variables X and the inner state variables Z by transformation of the distribution laws of these random quantities.

For practical purposes it is often expedient to use digital characteristics instead of the random factors' distribution laws. Although the digital characteristics give insufficient information on random factors, they fully suffice for the solution of certain transportation issues, and their determination is far easier. A complete analysis and synthesis of the characteristics of the transportation processes is carried out according to general characteristics, i.e. according to the conditional and unconditional distribution laws. These laws may be employed for the definition of different characteristics of the technological transportation processes. However, as the formula presented shows, the characteristics of the technological transportation processes may be determined in such cases when the general laws of random quantities' distribution are known. This condition must be observed in designing systems for the accumulation and processing of statistical information.

5. Description of criteria

As it was mentioned, it is important to create criteria system which would allow evaluating objectively the oversize and heavyweight cargoes transportation process.

Influence of the section of road pavement for the speed of cargo transportation in road transport (S_{AD}) – this criterion has two alternatives – asphalt (l_{A_1}) or gravel (l_{A_2}). These variants allow evaluating the speed of cargo transportation by different pavement on the route. This criterion has time dimension and evaluates the total time of transportation on the route. The total time depends also on the coefficient k_{ij} which is inversely proportional to the average of the speed.

$$S_{AD} = l_{A_1} k_{AD} + l_{A_2} k_{AZ}. \qquad (6)$$

Physical quality of road pavement in the moment of evaluation (F_{AQ}) – this criterion allows evaluating the quality and suitability for oversize and heavyweight cargo transportation. Criterion depends on the quantity of road sections where is necessary to make small improvement (x_{AF_1}), major repairs (x_{AF_2}) or building of new sections (x_{AF_3}) of the road.

$$F_{AQ} = x_{AF_1} k_{AF_1} + x_{AF_2} k_{AF_2} + x_{AF_3} k_{AF_3}. \qquad (7)$$

Small-radius curves of the road (F_{AS}) – criterion evaluates the costs and time which will be used for reconstruction of the route segment where a vehicle turning radius is too small. Criterion depends on the quantity of road sections where is necessary to make small improvement (x_{AS_1}), major repairs (x_{AS_2}) of the road.

$$F_{AS} = x_{AS_1} k_{AS_1} + x_{AS_2} k_{AS_2}. \qquad (8)$$

The corridor of cargo transportation in the section of the road is too narrow (F_{AKS}) – criterion has several alternatives: the width of the corridor meets the requirements of cargo transportation; small improvements (x_{AKS_1}), major repairs (x_{AKS_2}) of the route are needed. This criterion also evaluates the quantity of impossible route segments (x_{AKS_3}) in the considered route.

$$F_{AKS} = x_{AKS_1} k_{AKS_1} + x_{AKS_2} k_{AKS_2} + x_{AKS_3} k_{AKS_3}. \qquad (9)$$

The corridor of cargo transportation in the section of the road is too low (F_{AKZ}) – this criterion has also several alternatives: the height of the corridor meets the requirements of cargo transportation; small improvements (x_{AKZ_1}), major repairs (x_{AKZ_2}) of the route are needed. This criterion evaluates the quantity of impossible route segments (x_{AKZ_3}) in the considered route.

$$F_{AKZ} = x_{AKZ_1} k_{AKZ_1} + x_{AKZ_2} k_{AKZ_2} + x_{AKZ_3} k_{AKZ_3}. \qquad (10)$$

Too low bridge load capacity (F_{AT}) – criterion has also few alternatives which is important to evaluated: consolidation of the bridge or use of metal ramp (x_{AT_1}), requirement of building culvert in selected route (x_{AT_2}), requirement of new bridges building (x_{AT_3}), impossible route segments (x_{AT_4}) in the considered route.

$$F_{AT} = x_{AT_1} k_{AT_1} + x_{AT_2} k_{AT_2} + x_{AT_3} k_{AT_3} + x_{AT_4} k_{AT_4}. \qquad (11)$$

Need of reloading point installation on the route (F_{AP}) – total expenses for the installation of new reloading point on the route is actual when oversize and heavyweight cargo should be transported by several transportation modes (using multimodal transportation) and depends on the quantity of such places (x_{AP_1}).

$$F_{AP} = x_{AP_1} k_{AP_1}. \qquad (12)$$

The need for storing cargo along the route (F_{AY}) – this criterion is settled by the logistics scheme of cargo transportation. The need to store the cargoes (x_{AY}) is rational only in case when delivery costs of the transport mean of oversized and heavyweight cargo transportation are large or possibilities of their usage are limited.

$$F_{AY} = x_{AY_1} k_{AY_1}. \qquad (13)$$

Brrier caused by legal requirements (F_{AJ}) – criterion has four alternatives: need to cross village/town (x_{AJ_1}), need to cross protected territories (x_{AJ_2}), quantity of permissions for building reloading point on the route (x_{AJ_3}), quantity of permissions for building temporary storage place (x_{AJ_4}).

$$F_{AJ} = x_{AJ_1} k_{AJ_1} + x_{AJ_2} k_{AJ_2} + x_{AJ_3} k_{AJ_3} + x_{AJ_4} k_{AJ_4}. \qquad (14)$$

Intensity of the traditional transport in the section of the road under consideration (S_{AI}) – this criterion has three alternatives: lower intensity route segments (x_{AI_1}), medial intensity route segments (x_{AI_2}), high intensity route segments (x_{AI_3}). Purpose of criterion is to evaluate social consequences of heavyweight and oversize cargo transportation.

$$S_{AI} = x_{AI_1} k_{AI_1} + x_{AI_2} k_{AI_2} + x_{AI_3} k_{AI_3}, \qquad (15)$$

Influence of seasonal prevalence on the possibility to transport the cargo (K_{SE}) – this criterion evaluates seasonal prevalence and depends on the time (calculated as months) when it is allowed to transport oversize and heavyweight cargo (x_S).

$$K_{SE} = 0.5 x_S^2. \qquad (16)$$

Taxes for transportation of oversize and heavyweight cargo (F_{tax}) – criterion gives possibility to calculate taxes

for carrying oversize and heavyweight cargo which depends from length of transportation unit (l_1), allowed length of transportation unit (l_0), tariff for exceeded length (k_{x_1}), width of transportation unit (w_1), allowed with of transportation unit (w_0), tariff for exceeded width (k_{x_2}), high of transportation unit (h_1), allowed high of transportation unit (h_0), tariff for exceeded high of transportation unit (k_{x_3}).

$$F_{tax} = (l_1 - l_0)k_{x_1} + (w_1 - w_0)k_{x_2} + (h_1 - h_0)k_{x_3}. \quad (17)$$

Risk (R) – means probability of accident which is calculated according to Poisons formula and also evaluates the intensity of other transport means in selected oversize and heavyweight cargo transportation route. Risk level depends on: number of accidents in selected route section (k), accident average in selected segment of route (λ), safety elements which are applied to decrease the risk level (se), intensiveness of usual traffic (a), consequences of the accident in selected route section (C_i).

$$R = \frac{\sum a}{e^\lambda \sum kse} \sum C_i. \quad (18)$$

The criteria described above are also used in multimodal route selection system, where the selection of suitable sections of the route for transportation of oversize and heavyweight cargoes is made comparing various route alternatives and modes of transportation.

6. Oversize and heavyweight cargoes transportation route selection algorithm

When designing oversize and heavyweight cargo transportation route firstly is necessary to choose a trace of route in geographical territory depending on physical conditions. If the route lies in the territory where no substantive obstacles are, the trace of route must be as close as possible to direct line to ensure the shortest oversize and heavyweight cargo transportation distance. In case of existing natural geological obstacles the easiest solution is to avoid them or make them overpassive. Other designing case is intentionally planned oversize and heavyweight route as close as possible to economically active territories. All existing transport infrastructure is evaluated for transportation purpose after the trace is chosen. The first step of choosing is related with evaluating what kind of necessary road way infrastructure is available and what part of it satisfies oversize and heavyweight cargo transportation requirements. In this case task of design becomes much easier. But if there is no available infrastructure or some parts of it are missing, it is possible to define what kind of improvements should be implemented. In this case, it is enough to find an optimal cargo transportation solution according to transportation conditions such as

transportation time and additional consumptions for improvement of the route.

In case of unitary transportation of oversize and heavyweight cargo the improvement of the route is solved by temporary solutions. But if there is a possibility to recyclable transportations of such cargoes it is reasonable to create permanent kind of route. The correct choice of routes for carrying oversize and heavyweight cargoes enables to significantly improve economic environment in the analyzed area.

The system for evaluation of road transportation route mathematically is described by time (19) and expenditures dimension (20).

$$Z_{\min}(s) = \begin{cases} S_{AD} = l_{A_1}k_{AD} + l_{A_2}k_{AZ} \\ S_{AI} = x_{AI_1}k_{AI_1} + x_{AI_2}k_{AI_2} + x_{AI_3}k_{AI_3}, \\ K_{SE} = 0.5x_S^2 \end{cases} \quad (19)$$

$$Z_{\min}(F) =$$
$$\begin{cases} F_{AQ} = x_{AF_1}k_{AF_1} + x_{AF_2}k_{AF_2} + x_{AF_3}k_{AF_3} \\ F_{AS} = x_{AS_1}k_{AS_1} + x_{AS_2}k_{AS_2} \\ F_{AKS} = x_{AKS_1}k_{AKS_1} + x_{AKS_2}k_{AKS_2} + x_{AKS_3}k_{AKS_3} \\ F_{AKZ} = x_{AKZ_1}k_{AKZ_1} + x_{AKZ_2}k_{AKZ_2} + x_{AKZ_3}k_{AKZ3} \\ F_{AT} = x_{AT_1}k_{AT_1} + x_{AT_2}k_{AT_2} + x_{AT_3}k_{AT_3} + x_{AT_4}k_{AT_4} \\ F_{AP} = x_{AP_1}k_{AP_1} \\ F_{AY} = x_{AY_1}k_{AY_1} \\ F_{AJ} = x_{AJ_1}k_{AJ_1} + x_{AJ_2}k_{AJ_2} + x_{AJ_3}k_{AJ_3} + x_{AJ_4}k_{AJ_4} \\ F_{tax} = (l_1 - l_0)k_{x_1} + (w_1 - w_0)k_{x_2} + (h_1 - h_0)k_{x_3} \\ R = \frac{\sum a}{e^\lambda \sum kse} \sum C_i \end{cases} \quad (20)$$

Mathematic model described above provides universal mean for objective analysis of transportation options for carrying oversize and heavyweight cargo. This criteria system is applied for optimizing the design process of long term routes for oversize and heavyweight cargoes transportation in the certain territory.

7. Conclusions

Results of the scientific research suppose attitude that transport system is very complex and related to the different fields of the influence – economical, technical political and technological. A big amount of different contradictory interests and impact points must be formalized for the estimation and operations purposes. For this task the authors suggest a multi-criteria approach for the estimation and selection of the road transport route for oversized and heavyweight cargoes transportation.

Designed system of criteria creates possibility for objective evaluation of oversize and heavyweight cargo transportation processes.

Criteria system allows planning objectively long-term oversize and heavyweight cargo routes according to certain circumstances of economic development.

Criteria, described in the paper, are also used as the part of multi-modal route selection system, where the selection of suitable sections of the route for transportation of oversize and heavyweight cargoes is made by comparing various route alternatives and modes of transportation.

Criteria system allows unifying various criteria to one (time/money) basis what makes evaluation process of super heavy and oversize cargo routes in various modes of transport objective and efficient.

There always exists a theoretical possibility that not the whole set of criteria will be applied correctly. Because of changing approach to various technical, economic, social and environmental factors the number of criteria and value of their impact on the final evaluation result of oversize or heavyweight cargo transportation process is changing.

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