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## **INTENSIFICATION OF THE MTE TRANSPORTATION WORK BY FORMING RATIONAL STRUCTURE OF THE TRUCK FLEET**

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### **Түйін**

Қазіргі уақытта әрбір автокөлік кәсіпорны бірнеше номенклатура бойынша тасымалды жүзеге асырады, сондықтан АКК-ның пайдалану диспетчерлердің ең маңызды мәселесі – қажетті өнімділікті, тиімділікті және тасымалдың сапасын қамтамасыз ететін жылжымалы құрамының түрлерімен модельдерін таңдауықарастырылады. Мақалада АКК-ның жылжымалы құрылымына әсер ететін факторлардың анализі сипатталған.

### **Резюме**

В настоящее время, каждое автотранспортное предприятие осуществляет перевозку широкой номенклатуры грузов, поэтому перед работниками службы эксплуатации АТП и диспетчерами встает проблема выбора подвижного состава таких типов и моделей, которые обеспечивают необходимую производительность, экономичность и качество перевозок. Настоящая статья посвящена анализу различных факторов, влияющих на структуру подвижного состава автотранспортного предприятия.

*Keywords: motor transport enterprise, truck fleet, transportation work, freight turnover, market service, operational parameters*

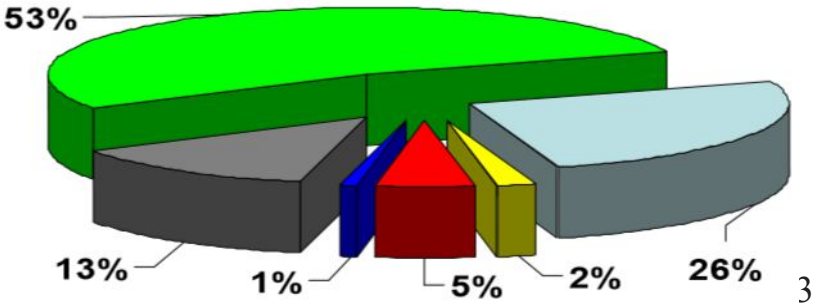
Nowadays, every motor transport enterprise is making carriages lots of good's nomenclature, that's why the most important problem of the maintenance service's workers and supervisors of motor transport enterprise is choosing the

kinds and models of vehicle, which procures required productivity, economy and quality of carriages. This article describes analyze of different factors, which influence on structure of motor transport enterprise.

In modern economies, the mobile technology is the basis of a number of sectors such as agriculture, road- building complex, transportation systems, transportation of goods and passengers, in both urban and inter-city conditions. In accordance with the President's State of the nation address on November 30, 2015 and message "Nurly Jol - Path to the Future" on November 11, 2014, as well as the State program of development and infrastructure integration of the transport system of the Republic of Kazakhstan until 2020, the main focus is to address the industrial development of the country, its processing industries, agro industrial complex, development of transport - logistical infrastructure.

Over the past 5-7 years, rapid economic growth in the Republic of Kazakhstan is heavily influenced on market of the trucks. This sector of the economy began to expand, so we can observe the growth of this segment.

The proportion of road transport in 2013 had 78.5 % of transported cargo, 15.5% of the total turnover, 98.3% of passengers and 85 % of passenger transport of the country. For many destinations in the region - it is the only form of transportation.



Picture 1 - Factors which increase competition in the market of the industry in 2013

- 53% - penetration in market of other companies;
- 26% - well organized structure of the park;
- 13% - reduction in domestic effective demand;
- 5% - activities of trade and intermediary organizations;
- 2% - the activity of the Antimonopoly Committee;
- 1 % - others

Among the factors increasing competition in the market of the industry in 2013 of the trucking companies, one of the most significant 26% is well-organized structure of the vehicle fleet.

Effective implementation of the transport operations of rolling-stock in motor transport company evaluates by its technical and operational characteristics. Conventionally, these indicators can be divided into two groups [1].

The first group - the indicators characterizing the degree of applying of rolling-stock (coefficient of technical readiness, applying vehicles, carrying capacity, mileage, average distance haul, the average distance transportation, idle time during loading and unloading, technical and exploitative speed).

The second group - the performance indicators of the rolling stock (number of rider, the total transportation distance, traffic volume, transport operation).

The brand choice and the number of vehicles for transport operation are calculated by technical and operational parameters such as:

1) Time of haulage:

$$t_e = t_{\text{пор}} + t_{\text{неп}} + t_{\text{паз}} + t_{\text{дв}}$$

Time of haulage - complete cycle of transport work consisting of loading ( $t_{\text{пор}}$ ) consignment ( $t_{\text{неп}}$ ), discharge ( $t_{\text{паз}}$ ) and supplying the vehicle for the next loading ( $t_{\text{дв}}$ ) (motion without load).

2) Turnaround time:

$$t_o = n_e \times t_{\text{дв}}$$

Includes one or more of the rider ( $n_e$  - number of the rider) with return transport to the starting point

3) The coefficient of technical readiness of the car park:

$$\alpha_m = A_{\text{г.э.}} / A_c$$

where:  $A_{\text{г.э.}}$  - the number of serviceable car motor company in operation;  
 $A_c$  - payroll car motor company

4) Vehicles utilization rate:

$$\alpha_n = A_{\text{э.к.}} / A_c$$

$A_{\text{э.к.}}$  — the number of cars in the road transport enterprise in service

5) The coefficient of static capacity utilization:

$$\gamma_c = Q_{\phi} / Q_B$$

$\gamma_c$  — factor;  $Q_{\phi}$  - the actual number of transported cargo, tons;  $Q_B$  - the amount of cargo that could be carried in a certain period, tons.

6) The dynamic capacity utilization:

$$\gamma_{\text{д}} = P_{\phi} / P_{\text{в}}$$

$P_{\phi}$ - actually performed turnover, tkm ;  $P_{\text{в}}$  - a possible turnover, tkm

7) Utilization rate mileage:

$$\beta = I_{\text{зп}} / I_{\text{об}}$$

$\beta$  - coefficient;  $I_{\text{зп}}$ - loaded trips, km;  $I_{\text{об}}$ - total mileage

8) Total mileage:

$$I_{\text{е}} = I'_{\text{о}} + I_{\text{гп}} + I_{\text{x}} + I''_{\text{о}}$$

$I'_{\text{о}}$  - the first zero Mileage;  $I_{\text{x}}$  - the return journey, km;

$I''_{\text{о}}$  - the second zero Mileage

9) The average distance haulage with cargo

$$L_{\text{ез}} = I_{\text{зп}} / n_{\text{е}}$$

$L_{\text{ез}}$  - the average distance haulage with cargo, km;  $n_{\text{е}}$ - number rider

10) The average distance of transportation:

$$L_{\text{ср}} = \frac{\Sigma P}{\Sigma Q}$$

$L_{\text{ср}}$ - average distance, km ; P - transport work, tcm ; Q - volume traffic, tonn

11) Technical speed:

$$V_{\text{т}} = I_{\text{об}} / t_{\text{об}}$$

$V_{\text{т}}$ - technical speed, km/h;  $I_{\text{об}}$ - total mileage, km;  $t_{\text{об}}$ - movement without load, h

12) Exploitative speed:

$$V_{\text{эк}} = I_{\text{об}} / T_{\text{н}}$$

$V_{\text{эк}}$ - cruising speed;  $T_{\text{н}}$  - while on duty, h

13) Number of carriages:

$$n_{\text{е}} = T_{\text{н}} / t_{\text{е}}$$

$n_{\text{е}}$ - the number of the rider;  $t_{\text{е}}$ - time of one haulage, h

14) One haulage's time:

$$t_{\text{е}} = \frac{I_{\text{гп}}}{\beta \times V_{\text{т}}} + t_{\text{н-п}}$$

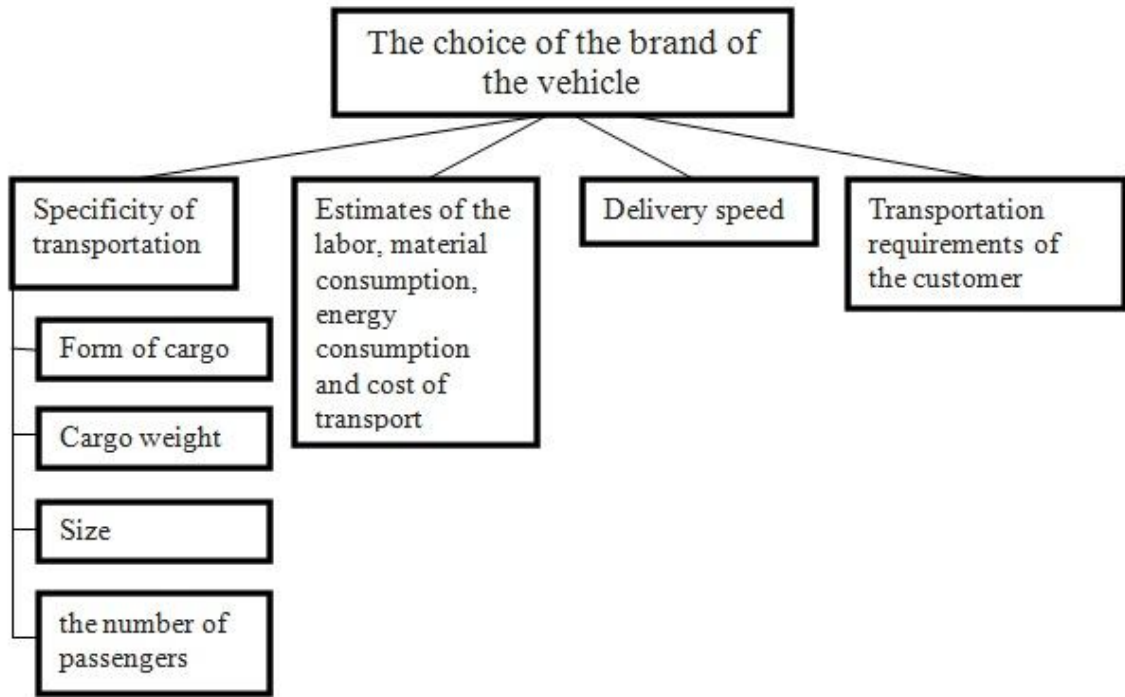
$t_{\text{е}}$  - Haulage one time, h;  $I_{\text{гп}}$ - loaded trips, km;  $t_{\text{н-п}}$ - downtime vehicle loading and unloading, h

15) Productivity of the rolling stock on duty:

$$Q = q \times \gamma_c \times n_e$$

q- capacity,  $\gamma_c$ - the coefficient of static capacity utilization [2].

Calculating the technical and operational parameters is not enough while it is time to choose the type of vehicle for certain work. In picture 2 shown the additional factors, which influencing the choice of the vehicle brand.



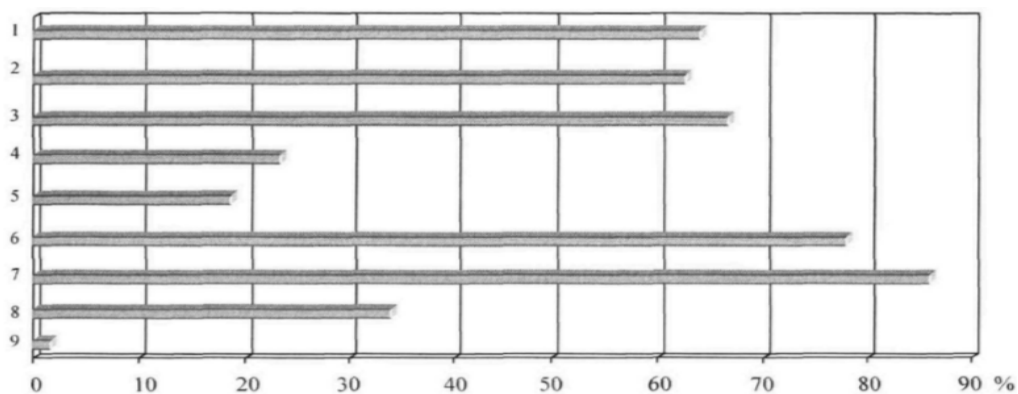
Picture 2 - Factors influencing the choice of the vehicle brand

So, for the formation of the structure of MTE it is necessary to analyze the factors affecting the choice of vehicles, as well as to determine the extent of their influence.

While analyzing the development trends of increasing the efficiency of complex technical systems should be considered another promising area of program - oriented planning, bearing the name abroad: Agreed engineering activities (AEA) - concurrent engineering in the terminology adopted in the United States , or simultaneous engineering on European terminology - provides the design stage managing the product lifecycle (production factors, especially the assembly , testing and maintenance) [3].

Practical implementation of the AEA associated with the solution of three interrelated problems: the reorganization of management, motivation and integration engineers knowledge.

The reasons and aims for using AEA shown in picture 3.



Picture 3 - Causes and intended use of the AEA on the transport companies:

1 - order management ; 2- decrease time study program services; 3- reduction of the total unit cost of the transport operation ; 4- reduction in the cost of transport services; 5 AEA presence of competitors ; 6- customer requirements of transport services; 7- competitiveness ; 8 to improve the quality of transport services; 9 - others

The technique of improving the structure of the rolling stock trucking companies on the basis of program - oriented planning is most effective.

Program - oriented planning - is a form of planning, which is based on the orientation of the activities to achieve these goals. In fact, any method aimed at achieving planning of any particular purpose [4]. But in this case, the basis of the planning process is defining and setting goals and only then choosing ways of achieving them. This implies that the feature of this method of planning is not just to predict future states of the system, also to offer a concrete program to achieve the desired results.

So, the development of technologies to improve the efficiency of the motor transport company, through the use of rational structure of the park on the basis of the program - targeted and logistics principles, is an important scientific and industrial problem.

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