ECONOMIC SUBSTANTIATION OF CALCULATION OF THE PROGRAM OF MAINTENANCE AND CURRENT REPAIR OF VEHICLES (MAN)

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Abstract: Meanwhile market economy, meeting unlimited needs from limited resources is one of our highest goals. Rational use of the raw material base will boost the country's economy. This, in turn, ensures cost-effectiveness and achievement of the desired goal by improving the products and services produced in various industries. Undoubtedly, the automotive industry is one of the leading industries today. Therefore, maintenance and repair work in this area is very important. With this in mind, we discuss in the article the analysis of the impact of internal factors affecting the maintenance and routine maintenance of vehicles.

Key words: Maintenance, current repair, efficiency, consumption, shift, truck

Introduction Modern transport must meet the real conditions of the external environment (economic and technological) to ensure normal operation and growth in the market of transport services. Unfortunately, the technical base for the production of many vehicles today does not meet today's requirements. In addition, due to the obsolescence of development regulations and the inability to provide maintenance and repair programs for modern transports, the current repair costs have increased, so it is necessary to develop a scientific approach to this situation. The development of a program of maintenance and repair of modern cars requires the development of guidelines that meet modern requirements.

The task before us is to improve the methodology for calculating the maintenance and repair production program, the choice of vehicles based on the conditions of international transportation, to determine the specific cost of labor in the current repair work.
The object of the article is to improve the methodology for calculating the maintenance and current repair production program of a car service with high-resource rolling stock.

This article used the methods used to acquire new knowledge and evidence, discover new formulas, improve theory and develop practical recommendations, methods of collecting and processing scientific and practical data: observation, comparison, analysis.

The research method of selecting the solution of the selected specific problem requires a sequence of solving specific problems based on the conditions, requirements and limitations of the research. For example, the improvement of the calculation method of the maintenance and current repair production program determines the sequence: first the quantitative indicators (factors) are evaluated, then the qualitative indicators. These are a means of addressing the purpose of the study.


Khasanov R.X. "Fundamentals of technical operation of automobiles."

Xamraev. Oh, Magdiev. Sh, Qodirov. T "Fundamentals of car service"

Usmonov. J "Regulations on maintenance of rolling stock of the Republic of Uzbekistan"

I also used foreign literature and internet materials.

From foreign scholars in the United States:


Belyaev VM "Organization of automobile transport and traffic safety."

I used the literatures above to organize service work, perform technological calculations and identify modern trends in the subject.

There are special requirements for vehicles. The most important of them is environmental friendliness. Therefore, the article considers the least harmful to the environment.

In this literature, the operational characteristics of the process of transportation of vehicles by the method of calculation of the production program for maintenance and repair of rolling stock, are described in detail. The article reviews the truck service process using the literature mentioned above.

150 MAN will be put into practice by economically justifying the organization of maintenance of truck loads. The cost of the service is calculated and compared with the market price, the degree of competition is taken into account when creating a service program. the bank loan interest is charged on the funds required for the implementation of the project, the repayment
period of which should not exceed the condition. Such an economic justification is made in the following sequence:

1. Preliminary data on the organization of maintenance of 150 MAN trucks are given in Table 1.1.

2. The main fund and production fund of the organization of maintenance of 150 MAN trucks is calculated.

3. Calculation of the organization of maintenance of 150 MAN trucks, the annual volume of maintenance and the cost of preparation (per unit of service).

4. A production program will be developed for the organization of maintenance of 4,150 MAN trucks. Revenue from it is cost, gross profit, depreciation and amortization.

5. The payback period for the organization of maintenance of 150 MAN trucks.

6. Indicators of the use of fixed assets: return on assets is the number of revolving funds, annual labor productivity, profitability.

I. Equipment, resources involved in the service process, their market prices and consumption norms (Table 1.1).

Table 1.1

<table>
<thead>
<tr>
<th>№</th>
<th>Name of indicators</th>
<th>Unit of measurement</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Organization of maintenance of 150 MAN trucks</td>
<td>Piece</td>
<td>1</td>
</tr>
<tr>
<td>2</td>
<td>The project cost is the introduction of the organization of maintenance of 150 MAN Euro-5 trucks</td>
<td>mln.soum</td>
<td>692000</td>
</tr>
<tr>
<td></td>
<td></td>
<td>mln.soum</td>
<td>950000*150=142500000</td>
</tr>
<tr>
<td></td>
<td></td>
<td>mln.soum</td>
<td>151364000</td>
</tr>
<tr>
<td>4</td>
<td>ATC productivity in the current Repair system</td>
<td>km/ day</td>
<td>72000</td>
</tr>
<tr>
<td>3</td>
<td>YMM standard:</td>
<td>Soum/lit</td>
<td>5500</td>
</tr>
<tr>
<td></td>
<td>Fuel</td>
<td>Soum/lit</td>
<td>24000</td>
</tr>
<tr>
<td>6</td>
<td>Number of employees:</td>
<td>People</td>
<td>240</td>
</tr>
<tr>
<td></td>
<td>Drivers</td>
<td>People</td>
<td>45</td>
</tr>
<tr>
<td></td>
<td>Repairmen</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Number of shifts</td>
<td>Shift</td>
<td>2,0</td>
</tr>
<tr>
<td>8</td>
<td>The average salary of workers</td>
<td>mln.soum.</td>
<td>4500,2500,1000</td>
</tr>
<tr>
<td>9</td>
<td>Number of working days per year</td>
<td>Day</td>
<td>303</td>
</tr>
</tbody>
</table>
II. The main and maintenance fund for the organization of maintenance of 150 MAN trucks is calculated. Also, the calculation of the service fund for the organization of work (cost) The cost of construction of the truck depot \( F_{\text{cons}} \times 800 = 8650 \times 800 = 692000 \text{mln.soum} \), The cost of freight cars 950000*150=142500000 mln.soum

Total freight cost of the car park 692000 +142500000= 151364000 mln.soum.

1) \( F_p = 151364000 \text{mln. soum} \)

3) Total fixed asset value \( F_t = 151364000 \text{mln. soum} \)

4) Working capital value \( F_w = F_t \times 0.14 = 151364000 \times 0.14 = 20046880 \text{mln. soum} \)

3) We find the total value of the production fund “\( \Sigma F_p \)”.

\[
\Sigma F_p = F_t + F_w = 151364000 + 20046880 = 163238880 \text{mln. soum}
\]

\[
\Delta F_p = F_p \times K = 163238880 \times 0.14 = 51583443 \text{mln. soum}
\]

K= \( \Sigma F_p + \Delta F_p = 163238880 + 51583443 = 186092323 \text{mln.Soum} \)

III Annual maintenance volume and preparation cost (per unit of service) for the organization of maintenance of 150 MAN trucks

a) annual service volume:

\[
\Sigma Q = d_n1 \times D_{wc} = 72000 \times 303 = 21816000 \text{ km/year, herein}
\]

\( d_n1 \) – Cargo ATK productivity 150 cars =72000 km/day

\( D_{wc} \) - calendar days at work, 303 day

IV The cost of arranging maintenance for 150 MAN trucks will be found. Income is cost, gross profit, depreciation and amortization. We calculate the unit cost of the service provided at the station. The cost of manufacturing a production unit is found by the following model:

\[
D_1 = m_1 + X_1 + X_2 + X_3 + X_4 + X_5 + X_6 + X_8 + X_9,
\]

\( m_1 \) labor cost per unit of product

\( X_1 \) - fuel consumption

\( X_2 \) - consumption of lubricants

\( X_3 \) - the cost of preparing the equipment for use

\( X_4 \) - tire consumption

\( X_5 \) - depreciation expense

\( X_6 \) - operating expenses

\( X_8 \) - gross profit

\( X_9 \) - Allocation of profits for the road fund

A) \( M_1 \) – Calculation of monthly salary expenses for a machine worker (driver)

\[
M_1 = T_g \times C_r \times K_3 \times 1.28 / \Sigma Q;
\]
Herein: $T_g$ – annual working hours of the designed bench

$K_d$ – coefficient of overfulfillment of the plan 1.2

$$T_g = D_{wc} \times T_c \times n \times N_{cw} = 303 \times 7 \times 2 \times 120 = 538734 \text{ hours/ year}$$

$D_{wc}$ – number of workers 303 day

$T_c$ – shift duration 7 hours;

$n$ - number of shifts 2.0

$N_{cw}$ - The number of cars in operation is 120

$$m_1 = T_g \times C_t \times K_d \times 1.28 \times \sum Q = 538734 \times 23788 \times 1.28 \times 21816000 = 752 \text{ soumm/km, herein}$$

$T_{year}$ – Annual balance hour of the projected car park;

$$T_{year} = D_{wc} \times T_c \times n \times N_p = 303 \times 7 \times 2 \times 127 = 538734 \text{ hours/year, herein}$$

$D_{wc}$ –303- workers of the year;

$T_s$ – shift duration, 7 s;

$n$ - number of shifts 2

$N_a$ - number of cars at work 127 cars;

$$C_t = (M/F)K_1 = \frac{3500000}{169.2}\times 1.15 = 23788 \text{ soum/year, herein}$$

$M$ – the amount of the monthly salary of the equipment worker; 3500 mln.soum

$F$ – monthly balance hour 169.2 hour

$K_1$ – fog coefficients 1.15;

$K_d$ – the coefficient that takes into account the overfulfillment of the plan (1.2);

$j$ – the balancing factor of the equipment worker;

$\sum L_i$ – the total mileage of annual vehicles

$B)$ 0.28 – social allocations;

$B)$ Fuel consumption $X_1 = \frac{F_{100}}{100}H_1* K_2 \text{ soum/km}$

$$X_1 = \frac{42}{100} \times 5500 \times 1.03 = 2379 \text{ soum/km}$$

$K_2$ – coefficient taking into account the winter period 1.03;

$F_{100}$ – fuel consumption is 42 liters per 100 km

$H_1$ – The cost of 1 liter of fuel 5500 soum/lit

3) Consumption of lubricants.

$$X_2 = X_{21} + X_{22} + X_{23} + X_{24} \text{ soum/km}$$

$$X_2 = 302 + 30 + 30 + 30 = 392 \text{ soum/km}$$

$$X_{21} = M_{100} H_1 \frac{F_{100}}{100} \text{ soum/km}$$

$$X_{21} = 0.03 \times 24000 \times \frac{42}{100} = 302 \text{ soum/km}$$

$$X_{22} = T M_{100} H_1 \frac{F_{100}}{100} \text{ soum/km}$$
\[ X_{22} = 0.003 \times 24000 \times \frac{0.42}{100} = 30 \text{soum/km} \]
\[ X_{22} = X_{23} - X_{24} = 30 \text{soum/km} \]
\[ X_{23} = CM_{100} \times H_c \times F_{100}^{100} \]
\[ X_{24} = \frac{M_{1000}}{1000} \text{soum/km} \]

\( H_m \) – Price of 1 liter of oil 24000 soum

\( M_{100} \) – Fuel consumption per 100 liters is the standard for a truck - 0.033

\( H_t \) – Price of 1 liter of transmission oil 24000 soum

\( T M_{100} \) – Price of 1 liter of transmission oil 24000 soum transmission oil standard per 100 liters of fuel (0.003)

\( H_g \) – Price of 1 liter of grease 24000 soum

\( G N_{100} \) – Price of 1 liter of grease 24000 soum grease consumption rate (0.003)

Consumption rate of 1 grease is the rate of consumption of grease per 100 liters of fuel (0.003)

\( M_{4000} \) – Minor consumption and wiping materials per 1000 km

4) \( X_3 \) - the cost of preparing moving content for use

\[ X_3 = X_{31} + X_{32} + m_2 \text{soum/km} \]

\[ X_3 = 67 + 52 + 293 = 412 \text{soum/km} \]

a) \( X_{31} \) – spare part consumption

\[ X_{31} = \frac{M_{spc}}{1000} \times K_3 \]

\[ X_{31} = \frac{56000}{1000} \times 1.2 = 67 \text{soum/km} \]

\( M_{spc} \) – Spare part cost per 1000 km 28000 soum

\( K_3 \) – coefficient taking into account road conditions.

\( K_3 = 1.0 \) for the first category road

\( K_3 = 1.1 \) for II and III category roads

\( K_3 = 1.2 \) for IV and V category roads

b) \( X_{32} \) – consumption of materials

\[ X_{32} = \frac{M_{cm}}{1000} \times K_3 \]

\[ X_{32} = \frac{40000}{1000} \times 1.3 = 52 \text{soum/km} \]

\( M_{cm} \) – Material consumption for 1000 km mileage 20000

v) \( m_2 = 1.3 \times m_1 \times H_{21} = 1.3 \times 752 \times 0.30 = 293; \)

\( H_{21} \) – the number of car mechanics per car:

For the truck 0,33
1.3 The coefficient of comparison of the salary of a car mechanic with respect to the driver. This is 1.2-1.3 for freight and bus.

3) Tire consumption $X_4$

$$X_4 = \frac{H_t + n}{L_t}$$

$X_4=2000000*14/140000=200$ soum/km

$H_t$ – Price of 1 set of tires 200 mln.so’m

$L_t$ – tire life 140 m.km

$n$ – the number of moving tires is 14

6) The cost of restoring moving content

$$X_5 = K * \frac{E_n}{\sum Q}$$

$X_5=186092323000*0,12/21816000=1023$ soum/km

$K$ – Balance sheet value of moving content.

Taking into account the loan interest for the ATK project 186092323 mln.so’m

$E_n=0,13$ normative coefficient of efficiency

$D_{wc}$ – working days of the year

$L_{day}$ – average daily mileage

7) $X_y$ we calculate the incomplete cost

$$X_y = m_1 + X_1 + X_2 + X_3 + X_4 + X_5 = 752 + 2379 + 392 + 412 + 200 + 1023 = 5158$$ soum/km;

$X_m = X_y + X_6 + X_9 = 5158 + 1612 + 483 = 7253$ soum/km;

$X_6 = D_1 * \eta_6 = 8059 * 0.20 = 1612$ soum/km

$X_9 = D_1 * \eta_9 = 8059 * 0.06 = 483$ soum/km

We determine the share of incomplete cost in revenue $\eta_{xy}$

$$\eta_{xy} = 1 - (\eta_6 + \eta_8 + \eta_9) \eta_6 = 0.20 \ \eta_8 = 0.10 \ \eta_9 = 0.04 + 0.02 = 0.06$$

$$\eta_{xy} = 1 - (0.20 + 0.10 + 0.06) = 0.64$$

8) We will determine the tariff on the account $D_1$

$$D_1 = X_y / \eta_{xy}$$

$$D_1 = 5158 / 0.64 = 8059$$ soum/km

10) We define the annual production program $\Sigma D_1; \Sigma X_m; \Sigma X_8$

$$\Sigma D_1 = D_1 * \Sigma L_t$$

$\Sigma D_1 = 8059 * 21816000 = 175815144000$ soum/year

$$\Sigma X_m = X_m * \sum Q = 7253 * 21816000 = 158231448000$ soum/year

$$\Sigma X_8 = \Sigma D_1 * \Sigma X_m = 175815144000 - 158231448000 = 17583696000$ soum/year

$$X'_8 = \Sigma X_8 * 1_{sol} = 17583696000 * 1 = 17583696000$$ soum/year, herein
\(J_{\text{tax}}\) – profit tax ratio (1).

1) We determine the internal capacity to repay the loan received
\[\Sigma X_{\text{im}}=\Sigma X_5+\Sigma X_8 = 22317768000+17583696000=39901464000 \text{ soum/year}\]

2) \(\Sigma X_5 = X_5 \times \Sigma Q_j=1023 \times 21816000 \times 1=22317768000 \text{ soum/year}\)

We will determine the deadline for returning the capital investment received for the project to the bank. We will determine the minimum whitewash period of the designed truck palace.
\[T_{\text{o'k}}=\frac{\Sigma F_p}{\Sigma X_{\text{im}}}=186092323:39901464000=4,66 \text{ year}\]

VI. We determine a number of indicators of the use of fixed assets: return on assets, the number of revolving funds, cost, productivity, profitability of production
\[\Sigma F_p = F_m + F_r = 151364000+20046880=163238880 \text{ mln. soum}\]
\[\Delta F_p = F_p \times K=163238880*0,14=51583443 \text{ mln. soum}\]
\[K = \Sigma F_p + \Delta F_p=163238880+51583443=186092323 \text{ mln. soum}\]

1) We determine the return ratio of the fund \(K_{\text{rf}}\)
\[K_{\text{rf}}=\frac{\Sigma D_j/F_p=175815144000/163238880}{100}=1,07 \text{ soum/soum, herein}\]

2) The effective volume obtained from modernization

3) \(E=\Sigma X_{\text{im}}\).

4) We define productivity
   a) technological workers
   \[P_{\text{tech}}=\frac{\Sigma D_j}{P} = 175815144000/254=692185 \text{ mln.soum/person, herein}\]
   \(P_{\text{tech}}\) – number of technological workers (equipment workers and masters)
   b) general workers
   \[P_r=\frac{\Sigma D_j}{P} = 175815144000/277=634711 \text{ mln.soum/person, herein}\]
   \(P_r=\text{P}_{\text{tech}}+ \text{P}_{\text{om}}=254+14+9=277 \text{ person, herein}\)
   \(\text{P}_{\text{om}}\) – other managers are 9 people and 14 repairmen

Table 1.2

<table>
<thead>
<tr>
<th>#</th>
<th>Indicators</th>
<th>Symbols</th>
<th>Unit of measurement</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Project to improve the calculation method of the maintenance and current repair production program</td>
<td>(N_p)</td>
<td>Com</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Fixed assets</td>
<td>( \sum F_m )</td>
<td>mln.soum</td>
<td>151364000</td>
</tr>
<tr>
<td>---</td>
<td>-------------</td>
<td>----------------</td>
<td>----------</td>
<td>-----------</td>
</tr>
<tr>
<td>3</td>
<td>The volume of revolving funds</td>
<td>( F_r )</td>
<td>mln.soum</td>
<td>20046880</td>
</tr>
<tr>
<td>4</td>
<td>Capital for the project</td>
<td>( F_p )</td>
<td>mln.soum</td>
<td>186092323</td>
</tr>
<tr>
<td>5</td>
<td>Fund return</td>
<td>( K_{fr} )</td>
<td>soum/soum</td>
<td>1.07</td>
</tr>
<tr>
<td>7</td>
<td>Number of drivers</td>
<td>( P_{tech} )</td>
<td>Person</td>
<td>254</td>
</tr>
<tr>
<td>8</td>
<td>Total number of employees</td>
<td>( P_t )</td>
<td>Person</td>
<td>277</td>
</tr>
<tr>
<td>9</td>
<td>Labor productivity</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>- to technical workers</td>
<td>( P_{tw} )</td>
<td>mln.soum/person</td>
<td>692185</td>
</tr>
<tr>
<td></td>
<td>- general workers</td>
<td>( \Pi_{gm} )</td>
<td>m.so’m/person</td>
<td>634711</td>
</tr>
<tr>
<td>10</td>
<td>Total cost</td>
<td>( \sum X_m )</td>
<td>mln.soum</td>
<td>158231448</td>
</tr>
<tr>
<td>11</td>
<td>Accounts receivable</td>
<td>( \sum D_1 )</td>
<td>mln.soum</td>
<td>175815144</td>
</tr>
<tr>
<td>12</td>
<td>Net profit</td>
<td>( \sum P_{np} )</td>
<td>mln.soum</td>
<td>17583696</td>
</tr>
<tr>
<td>13</td>
<td>Annual fruit</td>
<td>( E )</td>
<td>mln.soum</td>
<td>39901464</td>
</tr>
<tr>
<td>14</td>
<td>The payback period of the investment</td>
<td>( T_{pp} )</td>
<td>Year</td>
<td>4.66</td>
</tr>
</tbody>
</table>

**Economic efficiency indicators**

<table>
<thead>
<tr>
<th>Names of indicators and units of measurement</th>
<th>The value of indicators</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Annual production costs for maintenance and repair mln.soum</td>
<td>186092323</td>
</tr>
<tr>
<td>2. The amount of annual cost reductions mln.soum</td>
<td>7583696</td>
</tr>
<tr>
<td>3. Payback period of capital investment</td>
<td>4.66</td>
</tr>
<tr>
<td>4. Cost-effectiveness of project implementation</td>
<td>39901464</td>
</tr>
</tbody>
</table>

It was concluded that the project to organize the maintenance of 150 MAN trucks was based on today's market demand.

**Conclusion**  To conclude, in order to conduct an experimental study to test the idea that it is possible to determine the program of maintenance and current repairs for existing mobile enterprises of foreign-made cars, in the case of implementing the full idea of maintenance, cars We take into account the mileage of the walk in the regulations of the full complex maintenance.
However, in each individual case, the impact of vehicle downtime on maintenance and its timing on the overall performance of the maintenance and maintenance production program can be seen in the calculations and tables above can be viewed.

References

15. Sarimsakov AM “Methodological guidelines” for the implementation of the economic part of the Diploma Project Work in the field of “Ground Transportation Systems and Their Operation”, 2019