

**ОДРЖИВИ РАЗВОЈ
БРАНИЧЕВСКОГ
ОКРУГА
И
ЕНЕРГЕТСКОГ
КОМПЛЕКСА
КОСТОЛАЦ**



КОСТОЛАЦ, МАЈ 2019. ГОДИНЕ

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САОШПТЕНИ НА МЕЂУНАРОДНОМ САВЕТОВАЊУ

ОДРЖИВИ РАЗВОЈ БРАНИЧЕВСКОГ ОКРУГА И ЕНЕРГЕТСКОГ КОМПЛЕКСА КОСТОЛАЦ

Костолац, 23. мај 2019. године

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Костолац
Предавања по позиву са међународним учешћем**

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LOGISTIC ASPECTS OF THE ACTIVITIES OF THE ROLLING STOCK OF THE PUBLIC COMMUNAL COMPANY PRILEP 2017 (Republic of N. Macedonia)

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Abstract

In each transformational company its main activity is based on the work of the rolling stock. Collection, transportation and disposal of the municipal waste are functions that are an integral part of the operation of the rolling stock. Therefore the main benefits for the company that works with manipulation of the municipal waste can come only with a qualitative rolling stock. In this labor will be presented the existing operational concept for collection, transport and disposal of the municipal waste in the Community of Prilep with appropriate presentations of various exploitational indicators and measurements. The calculation of the corresponding analyses of the work of the rolling stock are directly investigated for realistic conditions. Thus this labor will undoubtedly contribute for the real improvement of logistic, economics and exploitation of the existing railroad facilities. Thus any future investment for improvement will be fully justified for the Community of Prilep.

1. Introduction

The rolling stock with its actions, collection, transport and disposal of the municipal waste for the Public Communal Company – Prilep presents main activity/ unit / service. By that the rolling stock in this company presents a fundamental part to its existence and basic responsibility, competence, activity and service.

Basically this company has a wide range of functions, different by character, purpose, territorial action, degree of specialization, size and other features that are part of the organizational chart.

The major part of the rolling stock in the Public Communal Company – Prilep is located in the waste sector, in which belongs and the mechanical workshop, which is competent to care or to maintain the rolling stock.

The rolling stock will put its fundamentality in forefront if its decisions are carried on a real basis. In this labor that reality is a basis, so the next chapters will be fully justified and unique only to this case.

2. Problem, subject and purpose of this labor

The rolling stock of the Public Communal Company – Prilep is heterogeneous, with a large variety of vehicles by brand, kind, type, year of

production, capacity, purpose, function, technical regularity and exploitation. The rolling stock of the working unit collection, transport and disposal of the municipal waste in 2017, contains 14 vehicles with 6 different brands and 13 different types. These data clearly define the research problem of this labor.

While the subject of research in this labor is logistic, economic and exploitation of the Public Communal Company – Prilep, considered through presentation of exploitation indicators and working measurements of the rolling stock of which arises, the dynamics of working of the Public Communal Company – Prilep, which will also be the target of this research labor and, it is a proposal of unimproved model for the utilization of the rolling stock –Prilep.

3. Structure of the rolling stock of the public communal company – Prilep

The structure of the rolling stock of the Public Communal Company – Prilep is next and is presented in the following table 1.:

In table 1 are given the age structure of the rolling stock with years of manufacturing and the average age of individual vehicles, in which the average age of the entire rolling stock can be calculated by the following formula 1:

$$S_{pr} = \frac{A_i \cdot g_i}{A_i}$$

Where:

- Spr – average age of vehicles,
- Ai – number of vehicles in 2017,
- Gi – age year of the vehicles.

Which means that the rolling stock of the Public Communal Company – Prilep is the average of 24,8 years. This points to the need of wider research in the future, founded on reality.

Table 1. Structure of the rolling stock from the working unit Collection, transportation and disposal of the municipal waste.

Sequence number	Brand of the vehicle	Purpose of the vehicle	Number of vehicles	Capacity	Age year	
					Year of manufacture	Average age ($A_i \cdot g_i$)
1.	Tam	Special heavy load	1	5 m ³	1974 год.	36 год.
2.	Mercedes	Special heavy load	1	5 m ³	1990 год.	21 год.
3.	Iveco	Special heavy load	1	5 m ³	1979 год.	31 год.
4.	Iveco	Special heavy load	1	22 m ³	1987 год.	23 год.
5.	Fap	Special heavy load	1	14 m ³	1988 год.	22 год.
6.	Fap	Special heavy load	1	18 m ³	1988 год.	22 год.
7.	Z - 640	Special heavy load	1	8 m ³	1994 год.	16 год.
8.	Fap	Special heavy load	1	16 m ³	1978 год.	32 год.
9.	Fap	Special heavy load	1	12 m ³	1974 год.	36 год.
10.	Iveco	Special heavy load	1	10 m ³	1991 год.	19 год.
11.	Mercedes	Special heavy load	1	7 m ³	1998 год.	12 год.
12.	Iveco	Special heavy load	1	7 m ³	1997 год.	13 год.
13.	Tam	Special heavy load	1	7 m ³	1974 год.	36 год.
14.	IMT	Tractor	3	7.5 m ³	1994 год.	48 год.
Total			16	143.5 m ³	/	24.87 y

Table 2. Indicators of the rolling stock of the Public Communal Company – Prilep for 2017.

Indicators of working of the rolling stock for 2010					
Sequence number	Indicator	Symbol	Measuring unit	Unit time table	Entire rolling stock
1.	Inverted number of vehicles	A_i	Vehicles	/	16
2.	Inverted auto days	AD_i	Days	365	5840
3.	Auto days of capable vehicles	AD_c	Days	318	5088
4.	Auto days of work	AD_r	Days	318	5088
5.	Auto days in the garage	AD_g	Days	47	752
6.	Auto days of driving	AH_w	Hours	2226	35616
7.	Auto days of work	AH_r	Hours	2544	40704
8.	Auto days in the garage	AH_g	Hours	6678	106848
9.	Auto days of dalliance	AH_d	Hours	318	5088
10.	Total time spend on the rolling stock	AK	Kilometers	35934	574944
11.	Total spend time on the rolling stock under load	AK_t	Kilometers	21560	344966
12.	Required number of drivings	AZ_i	Возења	2121	3617
13.	Amount of the transported cargo	Q	Tons	2025	32404
14.	Eamed transportation work	U	Tons / Kilometers	91541	1464661
15.	Time of loading and reloading	t_{ui}	Hours	1.63	8293.44

4. Description of the exploitation indicators and measurements of the rolling stock

The following indicators refer to the heterogeneous of the rolling stock, from the sector – collection of municipal waste of the Public Communal Company – Prilep, and present an introduction to the analysis and calculation of the transportation work performed in 2017. These indicators are presented in the following table 2:

From the data obtained in table 2 follows and the following calculations for the analysis and the working measurements of the rolling stock of the Public Communal Company – Prilep presented in the following title.

Table3. Presentation of the working measurements of the rolling stock of the Public Communal Company – Prilep, year 2017.

Show measurements work fleet in 2010			
Sequence number	Measurement	Period 2010	
1.	<i>Coefficient of utilization of the rolling stock</i>	0.871	
2.	<i>Coefficient of utilization of the capable rolling stock</i>	1	
3.	<i>Coeff. Of the technical accuracy of the rolling stock</i>	0.871	
4.	<i>Coeff. Of the utilization used in time of 24 hours</i>	0.333	
5.	<i>Coeff. Of the utilization of the working hours</i>	0.875	
6.	<i>Coeff. Of the utilization of the spend road</i>	0.599	
7.	<i>Medium lenght of driving under load</i>	95.37	
8.	<i>Total number of driving under load</i>	3617	
9.	<i>Medium distance of transport for one tone of goods</i>	45.2	
10.	<i>Medium daily spend road</i>	113	
11.	<i>Medium traffic speed</i>	16.14	
12.	<i>Exploitational speed</i>	14.125	
13.	<i>Coeff. Of the statistical utilization of the beneficial payload of the vehicles</i>	0.99	
14.	<i>Coeff. Of the dynamic utilization of the beneficial payload of the vehicles</i>	0.47	
15.	<i>Weight characteristic of the transportational work</i>	4.24	
16.	<i>Weight characteristic of the total amount of transported load</i>	8.95	
17.	<i>Full productivity</i>	W_U	10.449
		W_Q	0.231
18.	<i>Working productivity</i>	W'_U	35.98
		W'_Q	0.796

6. Productivity of the rolling stock of the public communal company – Prilep

The full productivity of the vehicles of the rolling stock W_U and W_Q , refers to the total calendar time of the vehicles (inventar hours or the hours of the calendar time). W_U in 2017 is 10.15 (tkm/h), and productivity for the same period is 0.223 (t/hi).

Working productivity of the vehicles of the rolling stock W'_U and W'_Q refers to the total working hours of the vehicles in the observed period. The value of W'_Q for the observed period is 0.77 (t/hr), and for W'_U is 34.86 (tkm/hr).

5. Calculation and analysis of the exploitation measurements of the rolling stock of the public communal company – Prilep

Calculations and analysis of the exploitation measurements of the rolling stock of the Public Communal Company – Prilep are presented in the following table 3.

From the data calculated in table 3, follows full working productivity and transformational work of the rolling stock of the Public Communal Company – Prilep, year 2017.

The full and the working productivity of the rolling stock depend from the measurements above, and their impact after the performed analytical calculations is presented on the following picture.

According to the full and the working productivity presented in figure 1, we concluded that the productivity of the rolling stock expressed in tons per time unit, decreases with the increasing of the average length of driving under load, while the productivity expressed in tonne kilometres, grows with the increasing of the medium length of driving under load.

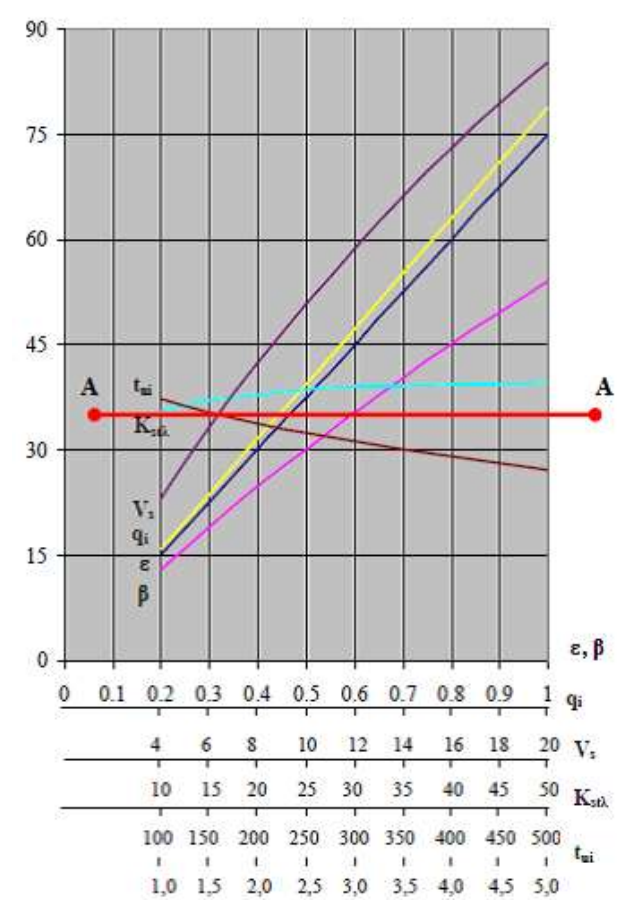
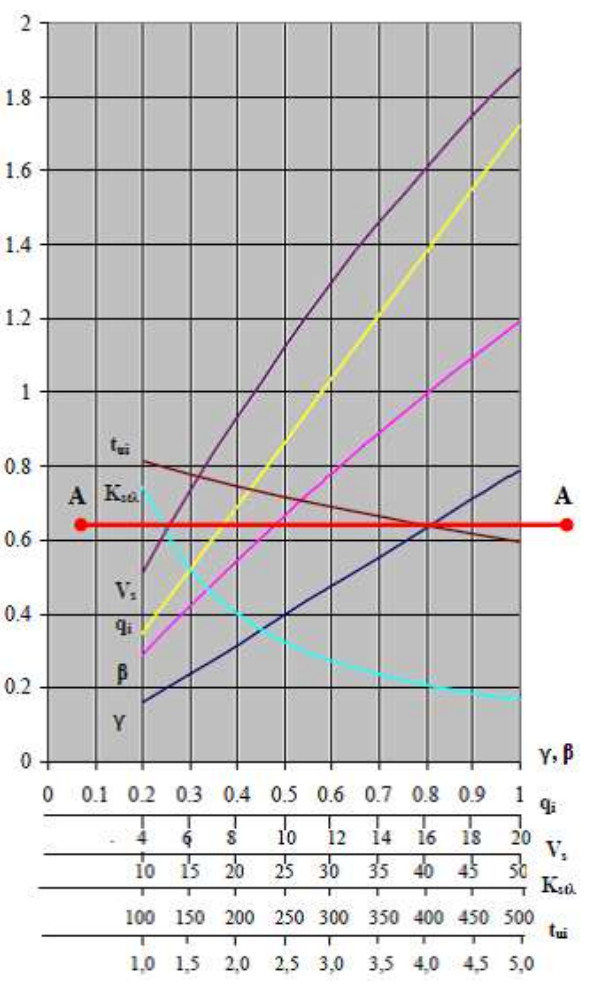
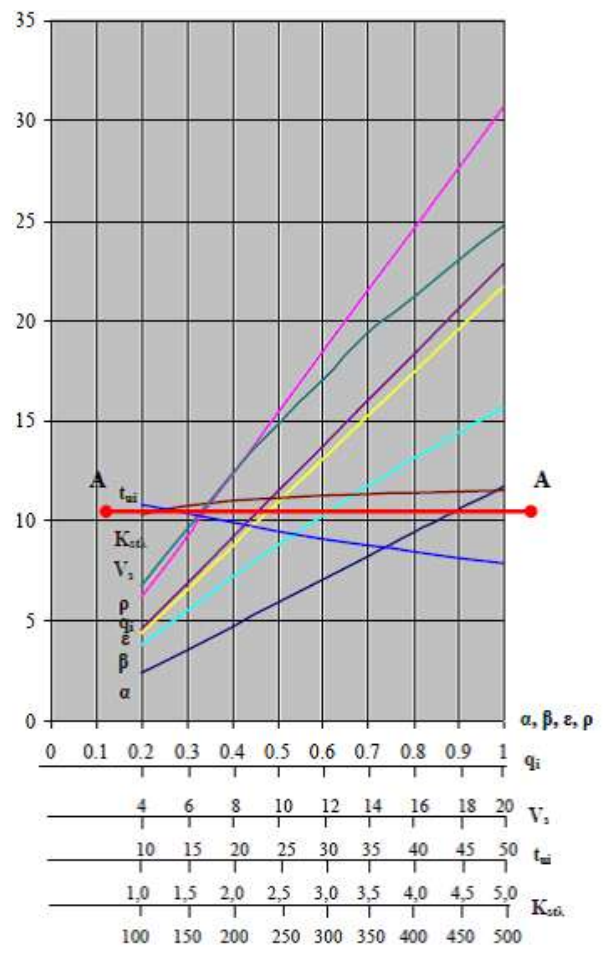
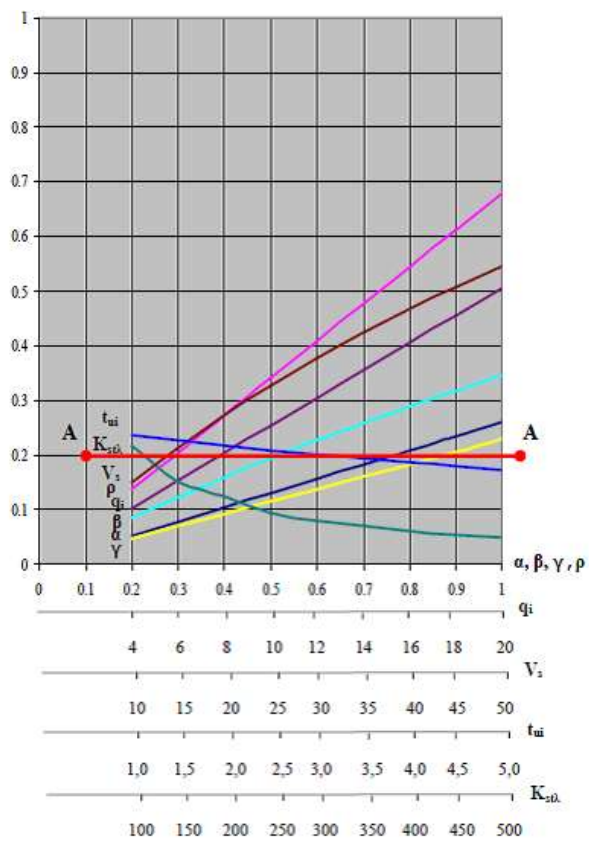


Figure 1. Display of the full and the working productivity of the rolling stock of the Public Communal Company – Prilep.

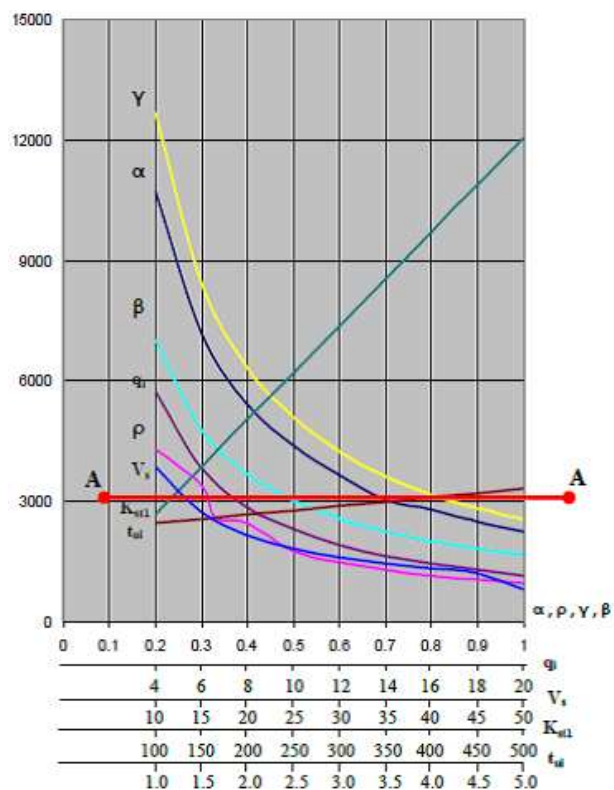
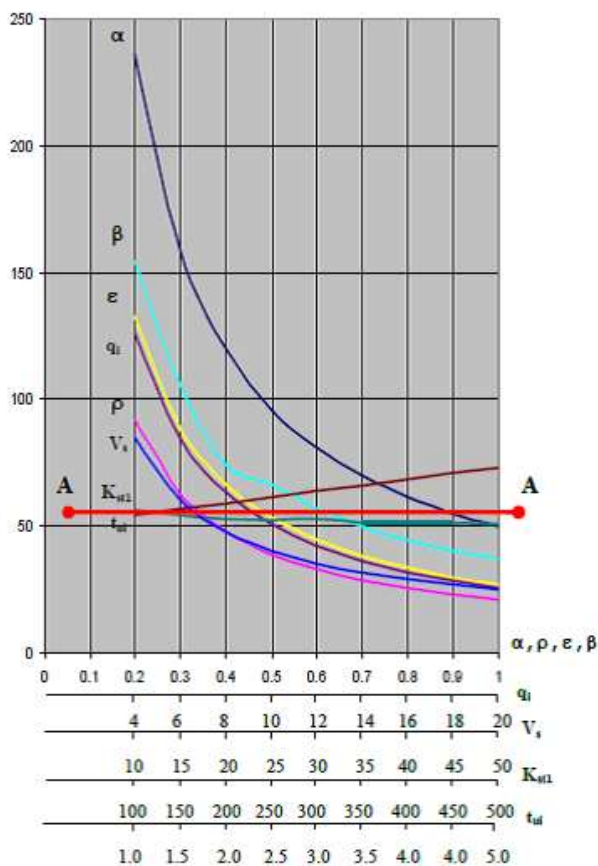


Figure 2. Presentation of the costs of the rolling stock of the Public Communal Company – Prilep.

7. Aspects of the rolling stock of the public communal company – Prilep

Aspects that must be satisfied for the quality of the work of the rolling stock are:

- Logistics (organizational);
- Economics (resources and costs);
- Exploitation (indicators and measurements).

Only if these aspect are satisfied as much as possible and are placed in the analyzes and calculations from the above measurements, success in the work, the quality of the future investments, will give a result, that will be the basis for better utilization of the work.

8. Basic for improved exploitation of the rolling stock of the public communal company – Prilep

On the following picture are presented the calculations for the costs of the rolling stock of the Public Communal Company – Prilep, from which derives the following proposition for improved utilization of the rolling stock.

On the following tables with number 4 and 5 are presented the prices of transport by TKM and quantity of the transported cargo.

Table 4. Change of the price of transport by tonne / kilometres.

Impact of the change of the exploitational measurements over the price of transport by tonne / kilometers																
Sequence number	α		ρ		ϵ		β		q_i		V_s		K_{st_i}		t_{ui}	
1.	0.2	237.74	0.2	92.66	0.2	133.89	0.2	154.62	4	127.34	5	159.9	50	63.72	1.0	53.82
2.	0.3	159.42	0.3	62.66	0.3	89.26	0.3	105.41	6	84.89	10	85.15	95.37	56.78	1.5	56.16
3.	0.4	120.27	0.333	56.73	0.4	66.94	0.4	81.13	8	63.67	15	60.23	100	56.42	1.63	56.78
4.	0.5	96.76	0.4	47.74	0.47	57	0.5	66.42	8.94	57	16.14	56.71	150	53.99	2.0	58.51
5.	0.6	81.09	0.5	38.75	0.5	53.55	0.599	56.66	10	50.93	20	47.77	200	52.77	2.5	60.86
6.	0.7	69.91	0.6	32.75	0.6	44.63	0.6	56.61	12	42.44	25	40.29	250	52.04	3.0	63.21
7.	0.8	61.51	0.7	28.47	0.7	38.25	0.7	49.62	14	36.38	30	35.3	300	51.55	3.5	65.56
8.	0.871	56.73	0.8	25.25	0.8	33.47	0.8	44.37	16	31.83	35	31.74	350	51.21	4.0	67.9
9.	0.9	54.93	0.9	22.76	0.9	29.75	0.9	40.29	18	28.29	40	29.07	400	50.95	4.5	70.25
10.	1	49.76	1	20.74	1	26.77	1	37.02	20	25.46	45	27	450	50.74	5	72.6

Table 5. Change of the price of transport by quantity of transported cargo.

Impact of the change of the exploitational measurements over the price of transport by tons transported cargo g_0																
Sequenc number	α		ρ		γ		β		q_i		V_s		K_{st_i}		t_{ui}	
1.	0.2	10810.2	0.2	4208.54	0.2	12772.64	0.2	7028.22	4	5767.04	5	7266.8	50	1516.76	1.0	2445.45
2.	0.3	7264.44	0.3	2847.76	0.3	8515.09	0.3	4801.38	6	3844.69	10	3870.36	95.37	2579.98	1.5	2552.11
3.	0.4	5465.13	0.333	2578.42	0.4	6386.32	0.4	3687.97	8	2883.21	15	2738.2	100	2688.36	1.63	2579.84
4.	0.5	4397.34	0.4	2167.36	0.5	5109.05	0.5	3019.92	8.94	2580.5	16.14	2578.46	150	3858.68	2.0	2658.77
5.	0.6	3687.26	0.5	1759.13	0.6	4257.54	0.599	2579.98	10	2306.81	20	2172.13	200	5029.00	2.5	2765.43
6.	0.7	3177.01	0.6	1486.97	0.7	3649.32	0.6	2575.33	12	1922.34	25	1832.48	250	6199.32	3.0	2872.1
7.	0.8	2795.65	0.7	1292.57	0.8	3193.16	0.7	2256.43	14	1647.72	30	1606.05	300	7369.64	3.5	2978.76
8.	0.871	2578.42	0.8	1146.77	0.9	2838.36	0.8	2017.84	16	1441.76	35	1444.32	350	8539.96	4.0	3085.42
9.	0.9	2499.05	0.9	1033.37	0.99	2580.5	0.9	1832.27	18	1281.56	40	1323.01	400	9710.28	4.5	3192.08
10.	1	2261.76	1	942.65	1	2544.52	1	1683.81	20	1153.4	45	1228.67	450	10814.5	5	3298.74

From here it can be clearly concluded that for better proposed model, we must affect over the exploitation measurements, in order they could increase or decrease, and the price to decline. At the same time clearly and unambiguously can be seen that this tabular presentation is the basis for improved utilization of the rolling stock in which accurately is known, which measurement is have a positive impact on the cost of transport and where they should take a certain action in the future.

9. Summary

In this labor we summarize that for the quality of working in the transport companies, they should have constant realistic researches of the rolling stock. With qualitative and continuous monitoring of the measurements and their indicators, as well as appropriate scientific analyzes, improvement will experience the citizens, as well as the employees.

By this the quality of the rolling stock will get the most, its alertness, accuracy, efficiency as a step towards the increasing of the profitability at work.

And finally we summarize that all the elements of this lab or have a mission to act in creating a long – term logistical, economic and exploitation benefits that only in association with a realistic calculations will be scientifically sustainable.

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