Efficiency of resource allocation to tasks in a transport company

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Abstract. The modern market makes the competition between economic entities very high. There are a lot of companies with a similar profile and size. Therefore, it is necessary to compete on many levels. Efficiency, both in terms of the use of material resources and human resources, becomes a key aspect. In the case of the use of material resources, the subject is very widely discussed and crucial for most enterprises. Companies try to keep vehicles in use for as long as possible.

1 Comparison of the use of truck tractors and trucks in Poland

On the basis of statistical data, Fig.1 was generated. In Poland, trucks are used much more often than truck tractors. The upward trend over the years is greater for trucks. Trucks rarely have bunks, which means that transport is usually short distances. On this basis, it can be concluded that most drivers work in the daily return to base system. Tractor units are a minority of all vehicles, but they are the basis for international transport [3].

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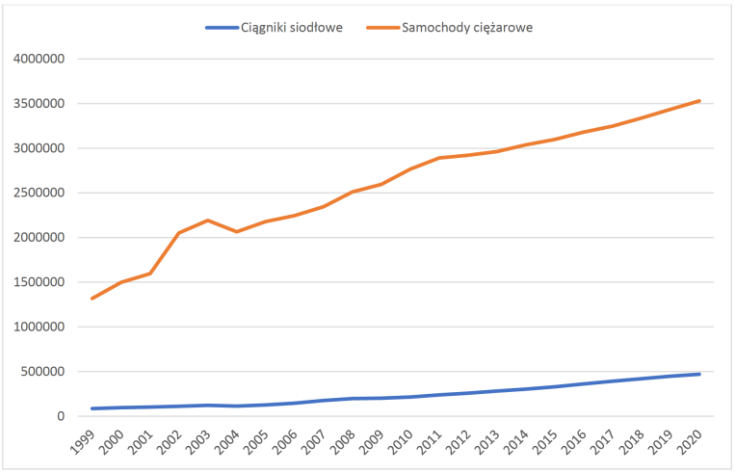

Fig.1. Number of trucks and tractor units over the years [own elaboration based on 4]

An important aspect in transport is the fuel used for power. Fig.2 shows a comparison of the use of individual drives. The most used fuel is diesel oil. In the case of truck tractors, it has a dominance of almost 90%. As an alternative, there are various test drives. Such as hydrogen or electric drives. In the case of trucks, diesel vehicles are also the backbone. However, in this case, the alternative is petrol and gas. Tractor units travel much longer distances, so they need to be recharged less frequently. For this reason, I don't use gas often. In the case of trucks, there is the aspect of entering the centers of urban zones. That is why I use more ecological forms of propulsion.

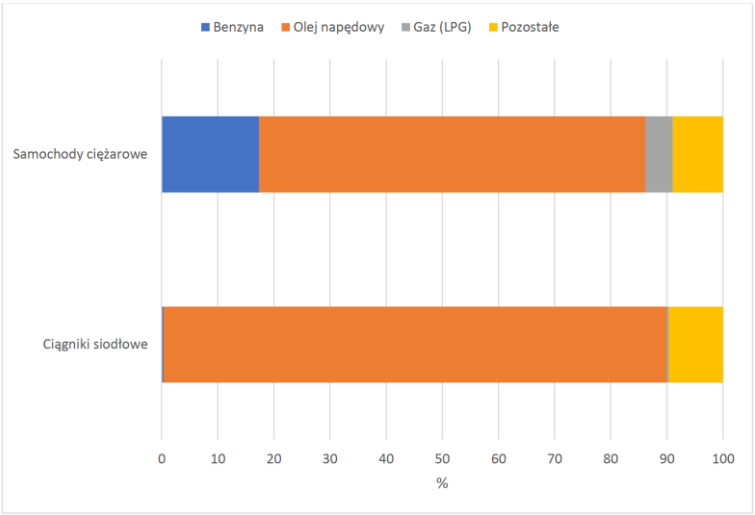

Fig.2. Percentage of registered tractor units and cars trucks in 2020 depending on the fuel used [own elaboration on base 15]

2 Model of resource allocation to tasks in a transport company

2.1 Survey research for route evaluation methodology

The survey was conducted with the help of Internet media. The survey was made using the Google Forms function. The respondents were professional drivers of domestic road transport of goods. 63 drivers took part in the study.
The questions can be divided into three groups of questions [1,2]:

- filter question,
- parameters setting questions,
- questions determining the significance of the parameter in the overall assessment.

Individual questions from the survey are presented below.
Question 1. How long have you been working in domestic freight transport?

a) Less than 1 year,
b) More than 1 year.

The question is designed to divide the answers according to seniority. Drivers who have just started work may not have a full picture of the driver's work. Therefore, such answers should be treated with more caution. The impact of the answers of drivers with little experience should therefore have a lesser impact on the final assessment.
Question 2. In your opinion, what is the optimal length of a single course? (There may be several courses during the day if one does not fill the whole working day)

a) A course that fills the whole working day,
b) A course that fills % of the working day.
c) Course filling ^ workday,
d) A course that fills % of the working day,
e) A course that fills less than % of the working day.

The question is to determine what length of the route is the most optimal for the driver. Thanks to this, you can assign scores to individual real routes.
Question 3. How important is the length of the course to you in assessing the entire route? (On a scale from 1 to 10, where 1 - not important, 10 - very important).
The question allows you to assess how much the length of a single route has an impact on the final rating.
Question 4. What is, in your opinion, the lowest possible road class for a comfortable journey?

a) Most of the route on the motorway,
b) Most of the route on the expressway,
c) Most of the route on a national road,
d) Most of the route along the provincial road,
e) Most of the route along the county road.

In practical transport, most of the route is done on different routes. The question allows you to assess what the acceptable minimum for an optimal and comfortable route is.
Question 5. How important is the road class for you in assessing the entire route? (On a scale from 1 to 10, where 1 - not important, 10 - very important).
Question 6. In your opinion, what is the largest possible number of loading places for a comfortable journey?

a) One load,
b) Two loads,
c) More than two loads.

The purpose of the question is to determine what is the maximum number of loads that is acceptable for a comfortable route.
Question 7. How important is the number of loading places for you in assessing the entire route? (On a scale from 1 to 10, where 1 - not important, 10 - very important).

The purpose of the question is to assess the impact of the number of loading places on the overall assessment of the course.

Question 8. What is, in your opinion, the largest possible number of landing places for a comfortable course?

a) One landing,
b) Two landings,
(c) More than two landings.

As in the case of the question about the number of loading places, the question is to determine the acceptable maximum number of unloading places.

Question 9. How important is the number of unloading places for you in assessing the entire route? (On a scale from 1 to 10, where 1 - not important, 10 - very important)

The essence of the question is to assess the impact of the number of landing sites on the final assessment of the route.

Question 10. In your opinion, what is the longest possible loading time acceptable for a comfortable journey?

a) 30 minutes,
b) 45 minutes,
c) 1 hour,
d) 2 hours,
e) 3 hours and more.

Loading time is an important aspect of a single route. The question is to determine what is the longest possible loading time that is acceptable for a comfortable route.

Question 11. How important is the loading time for you in assessing the entire route? (On a scale from 1 to 10, where 1 - not important, 10 - very important)

The question allows you to assess the impact of the loading time on the overall assessment of the route.

Question 12. In your opinion, what is the longest possible unloading time acceptable for a comfortable course?

a) 30 minutes,
b) 45 minutes,
c) 1 hour,
d) 2 hours,
e) 3 hours and more.

Unloading time, like loading time, is often an important part of the journey. The question is to determine what the acceptable maximum unloading time for the optimal route is.

Question 13. How important is the time of unloading for you in assessing the entire route? (On a scale from 1 to 10, where 1 - not important, 10 - very important)

The purpose of the question is to determine the impact of the landing time on the overall assessment of the route.

Question 14. In your opinion, what is the longest possible time of additional activities acceptable for a comfortable course?

a) 15 minutes,
b) 30 minutes
c) 45 minutes,
d) 1 hour,
e) 2 hours and more.

Sometimes additional activities, such as loading another car, are part of the route. The question is to determine what the maximum acceptable time for additional activities for a comfortable route is.

Question 15. How important is the time of additional activities for you to assess the entire route? (On a scale from 1 to 10, where 1 - not important, 10 - very important)

The purpose of the question is to determine the impact of the time of additional activities on the overall assessment.

3 Model of resource allocation to tasks in a transport company

3.1 Analysis of the survey

The results of the survey are presented in Table 1. The respondents were professional drivers of domestic road freight transport. 63 drivers took part in the study.

Table 1. Survey results

Question 1. How long have you been working in domestic freight transport?		
Response	Number of responses	
Less than a year	8	
More than a year	55	
Question 2. In your opinion, what is the optimal length of a single course? (There may be several courses during the day if one does not fill the whole working day)		
Response	Drivers working less than 1 year	Drivers working more than 1 year
A full-day course	2	30
A course that fills less than % of the working day	4	17
A course that fills ^ a working day	1	7
A course that fills % a working day	1	1
A course that fills less than % of the working day	0	0
Question 3. How important is the length of the course to you in assessing the entire route? (On a scale from 1 to 10, where 1 - not important, 10 - very important)		
1	0	3
2	0	0
3	0	0
4	0	1
5	2	4
6	2	6
7	1	9
8	0	10
9	1	5
10	2	17
Question 4. What is, in your opinion, the lowest possible road class for a comfortable journey?		
Most of the route on the highway	3	23
Most of the route on the expressway	2	11

Most of the route on the national road	1	12
Most of the route on the provincial road	2	4
Most of the route is on a county road	0	5
Question 5. How important is the road class for you in assessing the entire route? (On a scale from 1 to 10, where 1 - not important, 10 - very important)		
1	0	0
2	0	1
3	0	1
4	0	1
5	1	5
6	0	2
7	1	11
8	2	7
9	2	7
10	2	20
Question 6. In your opinion, what is the largest possible number of loading places for a comfortable journey?		
One load	6	35
Two loads	2	18
More than two loads	0	2
Question 7. How important is the number of loading places for you in assessing the entire route? (On a scale from 1 to 10, where 1 - not important, 10 - very important).		
1	0	1
2	0	1
3	0	0
4	0	0
5	0	3
6	0	2
7	1	5
8	1	8
9	3	6
10	3	29
Question 8. What is, in your opinion, the largest possible number of landing places for a comfortable course?		
One load	6	27
Two loads	2	26

More than two loads	0	2
Question 9. How important is the number of unloading places for you in assessing the entire route? (On a scale from 1 to 10, where 1 - not important, 10 - very important)		
1	0	2
2	0	1
3	0	0
4	0	0
5	0	2
6	1	2
7	0	5
8	1	7
9	3	13
10	3	23
Question 10. In your opinion, what is the longest possible loading time acceptable for a comfortable journey?		
30 minutes	2	7
45 minutes	2	3
1 hour	2	29
2 hours	2	16
3 hours and more	0	0
Question 11. How important is the loading time for you in assessing the entire route? (On a scale from 1 to 10, where 1 - not important, 10 - very important)		
1	0	0
2	0	0
3	0	0
4	0	0
5	0	1
6	2	3
7	0	3
8	0	7
9	1	15
10	5	26
Question 12. In your opinion, what is the longest possible unloading time acceptable for a comfortable course?		
30 minutes	1	8
45 minutes	3	6
1 hour	3	28
2 hours	1	13
3 hours and more	0	0
Question 13. How important is the time of unloading for you in assessing the entire route? (On a scale from 1 to 10, where 1 - not important, 10 - very important)		

1	0	1
2	0	0
3	0	0
4	0	0
5	0	1
6	1	2
7	1	4
8	0	7
9	2	12
10	4	28
Question 14. In your opinion, what is the longest possible time of additional activities acceptable for a comfortable course?		
15 minutes	0	8
30 minutes	2	25
45 minutes	2	7
1 hour	4	13
2 hours and more	0	2
Question 15. How important is the time of additional activities for you to assess the entire route? (On a scale from 1 to 10, where 1 - not important, 10 - very important)		
1	0	0
2	0	1
3	0	0
4	1	2
5	0	2
6	0	6
7	0	6
8	2	7
9	0	8
10	5	23

Due to the limitations, the survey focused on a random group of professional drivers to whom contact was limited. It can be observed in the results that drivers tend to choose a rating of 10 when the parameter is important for the assessment of the entire route. This may show that all tested parameters are very important for the assessment of the route. The study was carried out for the general public; therefore it did not include detailed situations that may actually occur in normal work. It is possible to improve the survey method by setting a certain number of points that the respondent must assign to questions about the significance of the parameter in the assessment of the route. This method will force the respondents to think and decide what is most important to them. However, due to the limited possibilities of contact with the respondents, a simplified questionnaire with a scale was used in the study.

4 Summary

The current tendency to use the human potential is usually limited to the maximum use of staff within the driving time. Currently, companies most often focus on the maximum use of

the driver's working time, but do not pay much attention to the routes that are assigned to a given driver. The more important point is always the profit, and fair distribution of routes recedes into the background. People, unlike machines, evaluate and compare themselves if they are in the same position. In the case where the driver drives on less demanding routes, and the other on more demanding ones when both have the same qualifications, this can cause conflicts.

Currently, companies are trying to give different extras depending on the routes. However, the most effective method is the method of fair distribution, which can cut off claims of favoring some employees. Conflicts in the relationship between the forwarder and the driver can lead to layoffs of the driver over time or various undesirable situations that ultimately have financial consequences. This also makes it necessary to use staff effectively, but the important aspect in this case is that if staff is poorly managed, costs will increase, because, for example, a new employee needs to be hired.

A lot of companies work in a two-shift system, where the driver goes home every day. Therefore, very often one route can be assigned to several drivers without much economic significance who will get it. In this case, a system of fair distribution can head off conflicts and accusations of unfair treatment. This is especially important now, where there is a shortage of drivers. The loss of each driver through conflict makes it necessary to find and hire a new one. However, this is often impossible due to shortages, and this means that some vehicles cannot go on the road. Therefore, the effectiveness of the use of human resources should be understood in a broader perspective. Not only to make the most of working time, but also to reduce the risk of conflicts and redundancies when economically possible. The issue of fair distribution in the company with the daily return of the vehicle to the base is largely limited to the organizational problem. Freight forwarders often do not pay attention to this problem, and it is an organizational problem that does not involve costs for material resources. The problem of effectiveness therefore concerns two areas that need to be combined in order to obtain a complete picture.

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