1 Introduction

At the present, there are any norms that are dealing with quality criteria in freight road transport. This norm does exist only in urban public transport. The norms STN EN 13816 a STN EN 15140 are dealing with the issue of quality of service in public passenger transport.

On the basis of norms, studies and publications were defined criteria for freight road transport.

2 Define the most transported kind of goods in freight road transport

The general quality criteria and also specific criteria for each kind of goods will be proposed on the basis of standards in urban transport.

There are many kind of good which are transported in freight road transport. Each kind requires the determination of specific quality criteria. The assumption is those kinds of goods will have some common criteria of quality. The most common criteria will be named the general criteria. They will be applicable in every type of goods. The following type of goods will be analyzed:

- dangerous goods,
- food,
- milk,
- packages/boxes,
- liquid goods,
- wood,
- oversized/overweight goods,
- water,
- concrete,
- animals,
- waste,
- bulk material,
- metallurgical material,
- vehicles,
- construction material.
The types of goods were estimated based on data of Police Department in Slovak Republic (PPZ SR). PPZ sent the database “number of registered trucks by type of body and vehicle category” to the date 31.12.2013 in Slovak Republic. The body of vehicle said which kind of goods is transported in and the type of goods was estimated. The vehicles which are not used for transportation of goods were filtered.

Filtered vehicles by body:

- semitrailer trucks,
- trailers for tractor,
- trailers for special tractor,
- caravans,
- trailers for motorbike,
- loaders.

There is no chance to find out for which kind of transport are the semitrailer trucks used. Based on the previous fact, semitrailer trucks were filtered. Trailers for tractor or special tractor are used mostly at farms and not for transportation. They were filtered, as well. The rest of vehicles cannot be used for transportation as we know it.

Filtered vehicles by category of vehicle:

- N1G,
- O1,
- O2,
- N1- pick up.

The categories O1 and O2 are used as trailers for passenger vehicles. For this reason, they were filtered. The category N1G was filtered, as well. From the category N1, “pick-ups” were filtered. Those vehicles are small and can be used for transportation of goods but also for private purpose. It is really difficult to write for which purpose they are used.

The number of specific vehicles which are used for transportation of different kind of goods is shown in Fig. 1.
From the Fig. 1, vehicles with box body were deleted. Number of those vehicles is very high compared to other vehicles and the differences between them would not be much visible, if they were in one graph (figure).

The vehicles with box body and flatbed trucks are shown in the following Fig. 2.

Based on the previous results, the questionnaire for transport, forwarding and logistics companies was created. The purpose of the questionnaire is to define the most transported kind of goods in freight road transport. The results of the questionnaire are shown in table 1.
Tab. 1 The most transported kinds of goods

<table>
<thead>
<tr>
<th>Druh tovaru</th>
<th>Percentuálny podiel</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wood</td>
<td>13,64%</td>
</tr>
<tr>
<td>Automotive</td>
<td>12,12%</td>
</tr>
<tr>
<td>Metallurgical material</td>
<td>10,61%</td>
</tr>
<tr>
<td>Bulk material</td>
<td>10,61%</td>
</tr>
<tr>
<td>Container</td>
<td>6,06%</td>
</tr>
<tr>
<td>Packages</td>
<td>6,06%</td>
</tr>
<tr>
<td>Waste</td>
<td>6,06%</td>
</tr>
<tr>
<td>Dangerous goods</td>
<td>6,06%</td>
</tr>
<tr>
<td>Food</td>
<td>6,06%</td>
</tr>
<tr>
<td>Liquid goods</td>
<td>6,06%</td>
</tr>
<tr>
<td>Electronics</td>
<td>3,03%</td>
</tr>
<tr>
<td>Medicines and Pharmaceuticals</td>
<td>3,03%</td>
</tr>
<tr>
<td>Oversized/ overweight goods</td>
<td>3,03%</td>
</tr>
<tr>
<td>Construction material</td>
<td>3,03%</td>
</tr>
<tr>
<td>Concrete</td>
<td>3,03%</td>
</tr>
<tr>
<td>Animal</td>
<td>1,52%</td>
</tr>
</tbody>
</table>

3 Define and selection of the most important quality criteria

The quality criteria were measured with Likert scale. Likert scale is able very easy way to express and measure opinion of respondents. Likert scale assumes that the strength/intensity of experience is linear, i.e. on a continuum from strongly agree to strongly disagree, and makes the assumption that attitudes can be measured. Respondents may be offered a choice of five to seven or even nine pre-coded responses with the neutral point being neither agree nor disagree [10-12].

The Likert scale is used to allow the individual to express how much they agree or disagree with a particular statement [12].

The questionnaire is divided to the following parts:

- Time:
  - compliance of travel time,
  - compliance of loading time,
  - compliance of unloading time.

- Customer care:
  - expertise of employees,
  - communication,
  - credibility of organization,
- politeness of employees,
- flexibility,
- language skills of employees,
- observance of the contract terms and conditions.
- **Vehicle:**
  - technical condition of vehicles,
  - vehicle equipment,
  - marking of vehicle,
  - suitability of vehicle,
  - theft protection,
  - environmental impact.
- **Operation and procedures of transport:**
  - abide of technology,
  - correctness of documentation,
  - shipment / packaging without damage,
  - vehicle monitoring,
  - abide of the planned route.
- **Human resources**
  - driver demeanor,
  - transport manager demeanor.

The questionnaire was sent to following organizations in Europe and in the U.S.:
- transport companies (A),
- forwarding companies and logistics companies (B),
- universities and research centers (C),
- manufacturing and tracking companies (D).

There was hypothesis that those organizations will see the quality in freight transport different.

The most important quality criteria of freight road transport were selected based on the questionnaire and the results are shown in table 2.

**Tab. 2 Average values of the quality criteria**

<table>
<thead>
<tr>
<th>Quality criteria</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Quality criteria “Time”</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>compliance of travel time</td>
<td>3.92</td>
<td>4.66</td>
<td>4.38</td>
<td>4.48</td>
</tr>
<tr>
<td>compliance of loading time</td>
<td>3.83</td>
<td>4.26</td>
<td>3.94</td>
<td>3.03</td>
</tr>
<tr>
<td>compliance of unloading time</td>
<td>3.83</td>
<td>4.21</td>
<td>4.03</td>
<td>3.35</td>
</tr>
<tr>
<td>expert of employees</td>
<td>3.67</td>
<td>4.34</td>
<td>4.06</td>
<td>3.42</td>
</tr>
<tr>
<td>communication</td>
<td>4.25</td>
<td>4.39</td>
<td>4.03</td>
<td>3.52</td>
</tr>
</tbody>
</table>
In these results was confirmed the hypothesis that each organization sees the importance of each quality criteria different. The first common quality criterion was searched in the results and it is shown in table 3.

**Tab. 3 The first common quality criterion**

<table>
<thead>
<tr>
<th>Rank</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>observance of the contract terms and conditions (4,58)</td>
<td>technical condition of vehicles (4,95)</td>
<td>transport manager demeanor (4,69)</td>
<td>transport manager demeanor (4,52)</td>
</tr>
<tr>
<td>2.</td>
<td>shipment / packaging without damage (4,50)</td>
<td>shipment / packaging without damage (4,74)</td>
<td>shipment / packaging without damage (4,66)</td>
<td>compliance of travel time (4,44)</td>
</tr>
<tr>
<td>3.</td>
<td>flexibility (4,42)</td>
<td>compliance of travel time (4,66)</td>
<td>observance of the contract terms and conditions (4,59)</td>
<td>theft protection (4,24)</td>
</tr>
<tr>
<td>4.</td>
<td>communication (4,25)</td>
<td>correctness of documentation (4,63)</td>
<td>compliance of travel time (4,34)</td>
<td>driver demeanor (4,04)</td>
</tr>
<tr>
<td>5.</td>
<td>correctness of documentation (4,25)</td>
<td>observance of the contract terms and conditions (4,55)</td>
<td>technical condition of vehicles (4,34)</td>
<td>correctness of documentation (4,00)</td>
</tr>
<tr>
<td>6.</td>
<td>credibility of organization (4,08)</td>
<td>credibility of organization (4,45)</td>
<td>correctness of documentation (4,31)</td>
<td>vehicle monitoring (3,71)</td>
</tr>
</tbody>
</table>
In table 3, it can be seen that the organization matched only in “correctness of documentation” and at the first places are different quality criteria. This fact also confirmed the hypothesis.

4 The importance weight of the quality criteria

When there were found out the average values of all quality criteria, it was possible to define weight of the quality criteria. For this purpose was used AHP method.

The AHP approach is considered one of the most complex and the most suitable for the quantitative assessment of quality in a multicriteria evaluation. Methods of determining the quality criteria are considered to be subjective if they are evaluated by respondents or experts. This approach allows the researchers to determine the weights of the criteria of the same hierarchical level with respect to higher level criteria or to determine hierarchically unstructured criteria weights. Experts compare all the evaluated criteria \( R_i \) and \( R_j \) (\( i, j = 1, ..., n \)), where \( n \) is the number of the compared criteria.

The method described above is easy to use because it is easier to compare pairs of criteria than all of them at a time. In this case, it is much more important a particular criterion which is compared to another. It is also possible to transform qualitative criteria estimates elicited from experts into the quantitative ones.

Thanks to AHP method was compared all 24 quality criteria and the results are shown in figure 3.
It can be seen that even after the transformation of data is ensured hierarchy request. The largest weights have "transport manager demeanor and compliance of travel time ".

5 Conclusion

The service quality in transport and forwarding is also a significant determinant of demand. In the competitive environment, it is an important tool for customer retention and also it has effects on the performance and economic results of the organization. When you have a competitive advantage it means to satisfy customer requirements but also to overcome their expectations. Dissatisfied customers are able to say their bad experience, which can affect the attitude of other customers. A dissatisfied customer means a loss of revenue, loss of missed opportunity and, in the end, loss of customers. Therefore, companies use a variety of methods for determining the deficiencies of products and services and, thereby, they increase the customer satisfaction.

The future of each organization depends on the customer behavior. Increasing the level of satisfaction must be one of the main objectives of each organization.
Acknowledgment

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References


Resume

The article deals with problems of defining of quality characteristics. The quality characteristics were designed based on existing standards in other transport sectors.
and based on the analysis of the structure of registered vehicles in the Slovak Republic and the weight of the quality criteria was defined by AHP method.

**Keywords**

Quality, criteria, road, transport

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