Development of service infrastructure for private motor boats in the northern regions

Svetlana Shvetsova*
Moscow Polytechnic University, 38, Bolshaya Semyonovskaya Street, Moscow, 107023, Russia

Abstract. This article examines the current trends in the development of infrastructure for the maintenance and repair of private motor boats in the northern regions (on the example of the Republic of Sakha (Yakutia)). A survey of motor boat owners in three different groups was conducted. The survey data provide data on the most relevant areas of infrastructure development for the maintenance and repair of private motor boats in the region. Results of the study of current trends in the development of infrastructure for maintenance and repair of private motor boats can be used for the development of programs for the development of water transport infrastructure, by manufacturers of motor boats, as well as in conducting new research in this area.

1 Introduction

Private motorboats are an important element of water transport in the northern regions. Such vessels are used for fishing, transporting goods and transporting people. For the stable development of this segment of water transport, an important condition is the availability of the necessary service infrastructure for maintenance and repair. This paper examines the current trends in the development of infrastructure for the maintenance and repair of private motor boats in the northern regions (on the example of the Republic of Sakha (Yakutia)) based on the analysis of the results of a survey of motor boat owners living and working in the region.

2 Materials and methods

To conduct a series of observations aimed at studying the opinion of motor boat owners living and working in the region about the most relevant areas of infrastructure development for the maintenance and repair of private motor boats in the region, a corresponding questionnaire survey of fifty motor boat owners was conducted.

The survey was conducted in three different age groups of motorboat owners:
- the first group of motor boat owners – villagers;
- the second group of motorboat owners are city dwellers;
- the third group of motor boat owners is working in the region.

* Corresponding author: s.v.shvetsova@mospolytech.ru

© The Authors, published by EDP Sciences. This is an open access article distributed under the terms of the Creative Commons Attribution License 4.0 (https://creativecommons.org/licenses/by/4.0/).
A group breakdown of motorboat owners (depending on their place of residence) was carried out to take into account the difference in opinions of motorboat owners in different territorial groups.

Questionnaires were distributed to all surveyed owners of motor boats, including the question: which of the areas of infrastructure development for the maintenance and repair of private motor boats in the region is the most relevant:

- The first option is to increase the number of points of sale of fuel, engines, consumables, accessories, etc. for motor boats;
- The second option is to increase the number of service (repair) points for motor boats.

For the purposes of collecting and processing data from the survey of motor boat owners, various methods used in the works [1-21] were considered.

3 Results and discussion

3.1 Results of the motorboat owners survey

3.1.1 First group of powerboat owners

The results of the survey of the first group of motorboat owners (villagers) are presented in Figure 1.

![Fig. 1. Results of the survey of the first group of motor boat owners (villagers).](image)

3.1.2 Second group of powerboat owners

The results of the survey of the second group of motorboat owners (urban dwellers) are presented in Figure 2.
3.1.3 Third group of powerboat owners

The results of the survey of the third group of motorboat owners (operating in the region) are presented in Figure 3.

![Bar chart showing data distribution](image)

Fig. 3. Results of a survey of the third group of motor boat owners (working in the region).

The distribution of data in the results of the survey of motor boat owners was estimated according to the formula:

\[ r_s = 1 - \frac{6\sum d^2}{n(n^2-1)} \]  

(1)

3.2 Discussion

The results of surveys of motor boat owners on the most relevant areas of infrastructure development for the maintenance and repair of private motor boats in the region provide data that the use of motor boats is already quite common among boat owners living and working in the region, while the opinions of motor boat owners about the most relevant
areas of infrastructure development for the maintenance and repair of private motor boats in the region are distributed unevenly among several options (Table 1).

**Table 1.** Results of surveys of three groups of motorboat owners (depending on the place of residence).

<table>
<thead>
<tr>
<th>Powerboat owner groups</th>
<th>The most relevant areas of infrastructure development for the maintenance and repair of private motor boats in the region</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Increase in the number of points of sale of fuel, engines, consumables, accessories, etc. for motor boats</td>
<td>Increase in the number of service (repair) points for motor boats</td>
</tr>
<tr>
<td>First</td>
<td>35</td>
<td>65</td>
</tr>
<tr>
<td>Second</td>
<td>47</td>
<td>53</td>
</tr>
<tr>
<td>Third</td>
<td>39</td>
<td>61</td>
</tr>
</tbody>
</table>

The average % of the data from the survey of motor boat owners on the most relevant areas of infrastructure development for the maintenance and repair of private motor boats in the region, for all territorial groups, is shown in Figure 4.

**Fig. 4.** The average % of the data from the survey of motor boat owners for all territorial groups.

From the data obtained (Figure 4) it follows that the importance of prioritizing the areas of infrastructure development for the maintenance and repair of private motor boats in the region is: an increase in the number of points of sale of fuel, engines, consumables, accessories, etc. for motor boats – 40%; increase in the number of service (repair) points for motor boats – 60%.

**4 Conclusions**

The study presents data on the current trends in the development of infrastructure for the maintenance and repair of private motor boats in the northern regions (on the example of the Republic of Sakha (Yakutia)). A survey of motorboat owners was conducted in three different groups. The survey data provide data on the most relevant areas of infrastructure development for the maintenance and repair of private motor boats in the region. The data reflects the opinions of motorboat owners, living and working in the region. The place of residence of motorboat owners is a data limitation. From the analysis of the survey data, it follows that the importance of the priority of infrastructure development for the maintenance and repair of private motor boats in the region is: increase in the number of
points of sale of fuel, engines, consumables, accessories, etc. for motor boats – 40%;
Increase in the number of service (repair) points for motor boats – 60%. The results of the
study of current trends in the development of infrastructure for the maintenance and repair
of private motor boats can be used for the development of programs for the development of
water transport infrastructure, by manufacturers of motor boats, as well as when conducting
new research in this area.

References
   https://doi.org/10.1016/j.solener.2023.04.051
   https://doi.org/10.1109/JIOT.2023.3263598
   https://doi.org/10.1109/ACCESS.2023.3245041
   https://doi.org/10.1016/j.future.2023.06.001
10. A. Shvetsov, E3S Web of Conferences 402, 04015 (2023). https://doi.org/10.1051/e3sconf/202340204015
11. A. Shvetsov, E3S Web of Conferences 420, 04007 (2023). https://doi.org/10.1051/e3sconf/202342004007
    https://doi.org/10.1051/e3sconf/202337104030
    https://doi.org/10.1155/2023/9992393
    https://doi.org/10.1051/e3sconf/202345807029
16. A. Shvetsov, Transition from traditional cars to electric ones in arctic regions. E3S
    Web of Conferences. (to be published)
17. A. Shvetsov, Study of the optimal distance between electric charging stations located
    on highways. E3S Web of Conferences. (to be published)
    https://doi.org/10.1051/e3sconf/202345807030
    https://doi.org/10.1016/j.trpro.2023.02.079
    https://doi.org/10.1016/j.trpro.2023.02.078