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Providing Real-Time Information to Passengers about the Current Schedule of Urban Passenger Transport

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Abstract

The article presents the choice of an alternative way to inform passengers in real time about the current schedule of public transport at transport stops in the city of Gomel (Republic of Belarus).

An act of passenger traffic survey at transport stops has been proposed, and a database has been developed to systematize

and process information about passenger traffic.

The transport stops for the installation of information panels have been identified, an analysis of various options for information panels and an assessment of their payback time has been carried out.

Keywords: Urban Passenger Transport, Real-Time Information, Transport Stops, Information Panel

1. Introduction

To support the mobility of the population in cities, the development of urban passenger transport is of great importance. However, its popularity has been declining in recent years.

The greatest preference is given to individual vehicles, which leads to an additional load on the roads ^[1].

One of the main objectives of the transport policy of the city administration is to increase the attractiveness of urban public passenger transport.

To achieve this goal, control systems using intelligent technologies can be used, which should provide ^[2-4]:

- The regularity of urban passenger transport, that is, minimizing delays of public transport on each route;
- Priority of urban public transport development;
- A high level of awareness of the population about the current schedule of route vehicles and the possibility of transferring to another type of transport;
- Providing current operational information to passengers at transport stops and in urban passenger transport vehicles.

2. Ways to provide real-time information to passengers

Recently, it has become common practice for transit operators to provide real-time information to passengers about the location or predicted arrival times of transit vehicles ^[5].

The primary behavioral changes associated with providing real-time information to passengers pertain to decreased wait times, reductions in overall travel time due to changes in path choice, and increased use of transit. Real-time information may also be associated with increased satisfaction with transit service and increases in the perception of personal security when riding transit ^[5].

It is more convenient for passengers to find out the estimated time of arrival of the transport stop of the desired route in advance, so as not to wait at the transport stop. If there is no route suitable for the time, the passenger can plan the trip in some other way.

Modern transport monitoring systems allow you to display all the necessary information on any device connected to the Internet: a personal computer, laptop, tablet, smartphone.

Information panels are one of the means of informing passengers at public transport stops.

The use of information panels has several advantages. This is a real-time display of information about the arrival of public vehicles. The installation of information panels will allow people not to get on the first bus that arrives at the transport stop, but

to wait for the best option. In the evening, there is a possibility to stand at a public transport stop for a large amount of time, in this regard, the information on the information panel will allow you to make one or another decision in choosing a vehicle and further mode of travel.

Information panels contain key information so the user can be guided within the city and move independently, quickly and efficiently. This information should give the user the necessary conditions so that he will understand how to proceed to move more quickly, facilitating the users' orientation and mobility. The way to use informational elements to accomplish this task can be quite varied, according to the local culture with differences from one region to another. If panels of different countries are analyzed, differences may be higher [6].

The aim of the work is to choose an alternative way to inform passengers in real time about the current schedule of public transport at transport stops in the city of Gomel (Republic of Belarus), identify transport stops for installing information panels, analyze various options for information panels and estimate their payback time.

3. Analysis and selection of information panels for installation at transport stops

Currently, information panels are installed at seven bus stops in the city of Gomel. In the city of Gomel LLC «LEDBOX Company» is engaged in the manufacture and maintenance of information panels.

During the manufacture of information panels, the issues of their size were coordinated and approved with the Department of Trade and Services of the Gomel City Executive Committee.

LLC «LEDBOX Company» provides the customer with the opportunity to choose the size of information panels. The standard sizes of the information panels workspace include (Fig 1):

- 1) 960 millimeters by 1440 millimeters;
- 2) 960 millimeters by 640 millimeters.

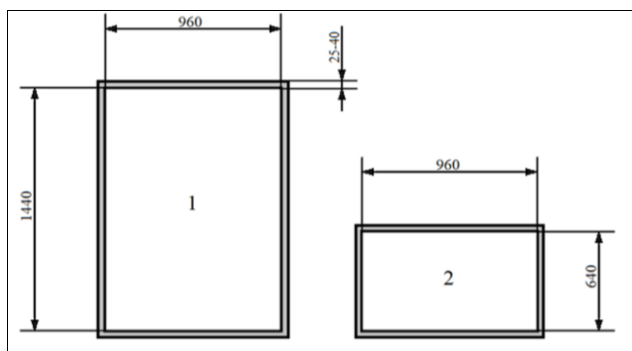


Fig 1: Standard sizes of the information panels workspace

The main difference between the information panels presented above is the height of the workspace screen. This is due to the tasks of operating information panels.

The first option displays both the current schedule of route vehicles at the bottom of the screen and can display static ads or ads in the form of videos at the top of the screen. The size of this information panel allows you to divide the advertising area into parts.

The second option has a smaller workspace, which makes it possible only to display the current schedule of public transport.

Thus, the first version of the information panel makes it possible to recoup the funds invested in its purchase and maintenance by publishing advertisements on it. Also, the obvious difference between these information panels is their cost, which in turn depends on the quality and material of the components.

LLC «LEDBOX Company» provides a choice of three types of assembly of components, depending on the available funds:

- Budget assembly;
- High-quality assembly of high-quality components;
- Energy-saving assembly of high-quality energy-saving components that save from 20% to 60% of electricity, unlike other analogues.

The cost of the information panel depends on the assembly option and the size of the workspace (Table 1)

Table 1: The cost of the information panel depends on the assembly option

The information panel parameters		The cost of the information panel	
The size of the workspace (millimeters)	The assembly option	1 panel	10 panels
960×1440	budget assembly	2510 \$	25100 \$
	high-quality assembly	2956 \$	29560 \$
	energy-saving assembly	3492 \$	34920 \$
960×640	budget assembly	1510 \$	15100 \$
	high-quality assembly	1788 \$	17880 \$
	energy-saving assembly	2121 \$	21210 \$

The payback period of the information panel, considering advertising, will come:

- For a budget assembly for the tenth month;
- For high-quality assembly for the twelfth month;
- For energy-saving assembly for the thirteenth month.

4. Identification of transport stops for the installation of information panels

To select ten transport stops in the city of Gomel for the installation of additional information panels, an analysis of passenger traffic survey data was carried out.

The analysis of passenger traffic is carried out according to the acts of passenger traffic survey on the routes. The standard act of passenger traffic inspection indicates:

- Information about the route (route number);
- Information about the route vehicles operating on this route (vehicle number);
- Serial number of the act;
- Date of completion of the act (date, month, year);
- Name of the transport stop in the forward and reverse directions;
- The time of departure of the route vehicle from the final transport stop;
- The number of passengers entering/ exiting at each transport stop;
- Filling capacity of the passenger compartment of the route vehicle
- Signature and surname with initials of the employee filling out the act.

Based on the acts for the analysis of passenger traffic, an electronic database on weekdays and weekends has been created, containing the following information:

- Name of the transport stop;
- Route number;
- The total number of passengers entering / exiting the route at each transport stop for a full working day;
- The number of fixed-route vehicles operating on each route;
- The number of passengers entering / exiting at each transport stop for a full day on each route;
- The total number of passengers who passed through the transport stop during the day.

To identify the stops where the installation of information panels is most rational, the database was analyzed according to two criteria: passenger traffic and the flow of route vehicles at the transport stops. As a result, ten transport stops were identified for the installation of information panels in the city of Gomel (Table 2).

Table 2: Transport stops for the installation of information panels

S. No	Name of the transport stop	Estimation
1	Karpovich street	16,56
2	Krestyanskaya street	14,34
3	StankoGomel	12,92
4	Solnechnaya	11,99
5	Karpovich street (2)	11,91
6	Kuibyshevsky passage	10,95
7	Rogachevskaya street	10,83
8	Lenin Square	10,57
9	Rechitsky Avenue	10,38
10	Holy Trinity Church	10,07

5. Research results

Calculations have shown that the proposed method of data collection, using the acts of passenger traffic survey, is most effective when creating a database. The creation of a database allows not only to systematize data, but also makes it possible to process this data. Using this database, transport stops where the installation of information boards is most rational are highlighted. At the same time, the weekly passenger traffic at each transport stops and the number of route vehicles passing through a particular transport stop during the day were considered.

Various options of information panels for installation at bus stops are given. The payback period for information panels that can publish advertisements on them has been calculated. Thus, carrying out the above-mentioned activities will make it possible to select the transport stops most objectively at which the installation of information panels is rational and choose the type of information panels for specific tasks.

6. Conclusions

Information support for passenger transportation will improve the quality of public transport services. Improving information support will decrease the waiting time at public transport stops by reducing the waiting time and by optimizing the route of the trip to the destination in various parts of the city for passengers.

7. References

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