Formation and Analysis of Urban Passenger Traffic Control

F.A.Omonov Assistant, Fergana Polytechnic Institute, Fergana, Uzbekistan
Email: fayzullo9596@gmail.com

O'.U.Sotvoldiyev Assistant, Fergana Polytechnic Institute, Fergana, Uzbekistan
Email: u.u.sotvoldiyev@ferpi.uz

ABSTRACT

The article presents a schematic algorithm that shows the sequence of the dispatcher's work on the analysis of the automated dispatching management of the city public transport, the process of studying the contents of the movement, as well as the elimination of any inconvenience (increased waiting time for passengers, the implementation of an inefficient movement procedure, Traffic Safety).

Keywords: ADMS, algorithm, scheme, dispatch action groups, monitoring, operation, passenger, traffic.

Introduction

Analysis of the composition of the control effects of the dispatchers of the Automated Dispatch Management System (ADMS), which performs work on the control, analysis and management of passenger traffic of urban passenger transport [1-7]. The analysis of the management impact structure of ADMS dispatchers should be carried out in several stages:

- in the first stage, describing the technology of performing basic operations performed by the software of the automated control room;
- in the second stage, on the basis of the basic operations described above, describing the management methods that can be applied in different situations;
- In the third stage, the list of violations of the transport process is analyzed, which indicates the main criteria by which the situation can be determined and the methods that allow restoring the operation of vehicles on the route;
- In the fourth stage, statistical analysis of the frequency of dispatching operations at different times of the day, as well as the construction of graphic schemes of dispatching operations in the form of flow charts and their analysis to form conclusions and recommendations for further improvement of automated dispatching technology of urban passenger transport; operation in high-density traffic flows.

Materials and methods

An analysis of the actions of the dispatch management system allows the separation of the list of control effects. As a result of the study, the control effects were divided into 3 groups (shown in Figure 1 below) [8-14].

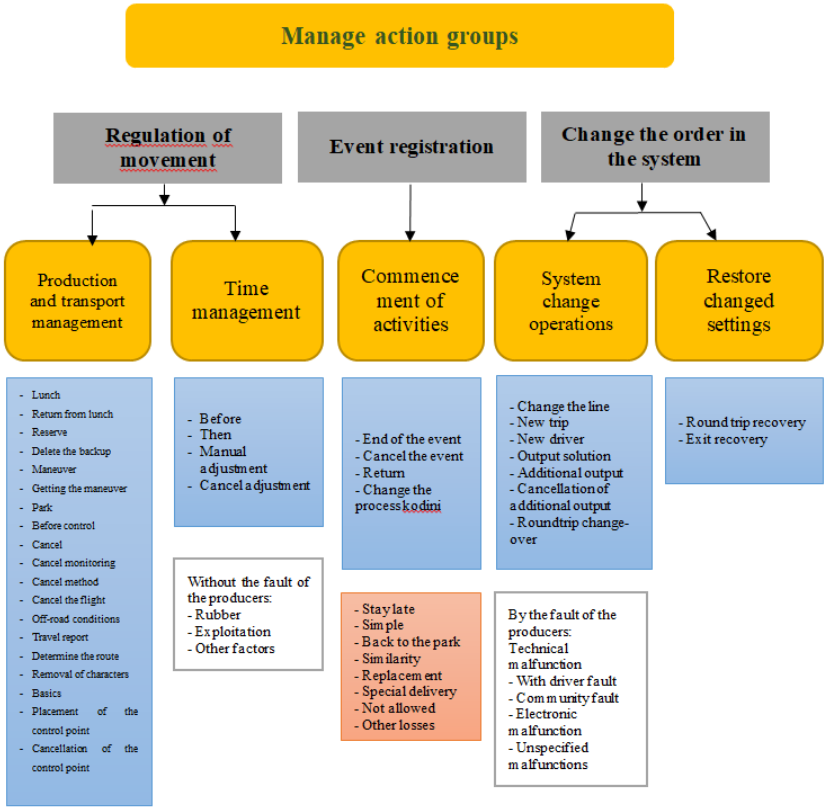

Figure 1. Percentage of weekly control actions (average value)

Control groups. Statistical analysis of the frequency of dispatch control operations at different times of the day. Statistical analysis of the frequency of the most commonly used dispatch control operations, including the frequency of their performance at different times of the day on different days of the week, was conducted when passenger traffic operated in the conditions of high-density traffic flows [15-21]. All operations (control actions) were grouped according to the structure shown in the figure above. As a result, the percentage of different groups of control actions shown in Figures 1 and 2 was obtained.

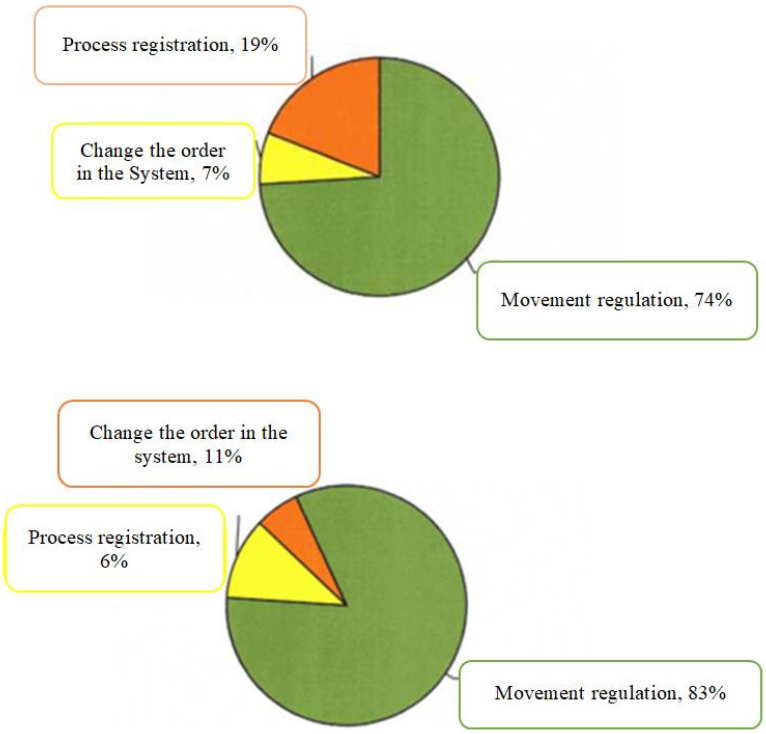

Figure 2. Percentage of completed control operations on the day off (average value)

Analysis of the built-in diagrams clearly shows that on both weekdays and weekends, traffic control operations are performed much more often than others. This suggests that it is necessary to improve the operations of this group in the first place. In this regard, the operations of this group were considered in detail [22-29]. Figures 3-4 show diagrams showing the percentage of different action regulatory operations performed by system managers on weekdays and weekends. The results of the analysis of the management impact structure of ADBT dispatchers are presented [30-34].

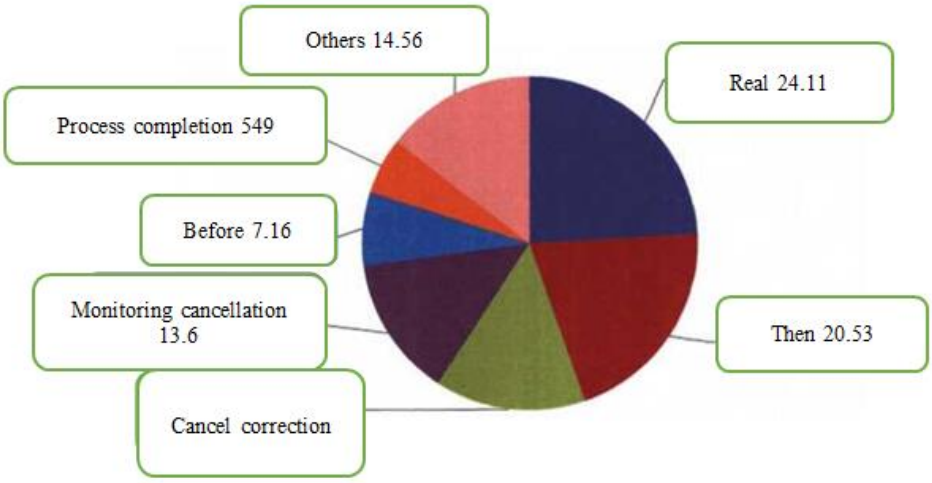

Figure 3. Percentage of control effects on traffic regulation performed by weekly system dispatchers (average)

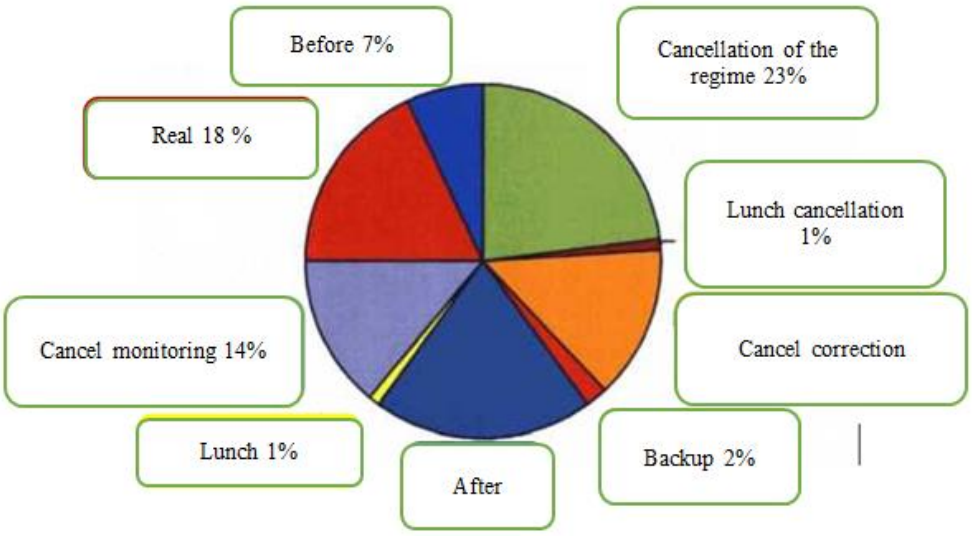

Fig. 4 Percentage of control effects on traffic regulation performed by a dispatcher, a day off (average).

The analysis made it possible to distinguish the most frequently performed operations on traffic regulation. These operations include cancellation of monitoring; later; before; in fact. The quantitative superiority of these operations clearly demonstrates the significant loading of the control system, resulting in traffic conditions on the route organized by high-density traffic flows [35-38].

In rapid analysis and development of the structure of technological operations to regulate the transport process, it is necessary to emphasize the main technological feature of these operations - the complex nature of these operations. The complexity of performing these operations is explained by the fact that they are the object of analysis and a general direction in which regulatory effects can be performed.

We describe in detail the execution structure of the individual elements of this process, shown in Figure 5. The first action of the dispatcher is a special window call where you can quickly get information about the status of the transport process on each route. In the flow diagram, this motion is reflected in block 1.

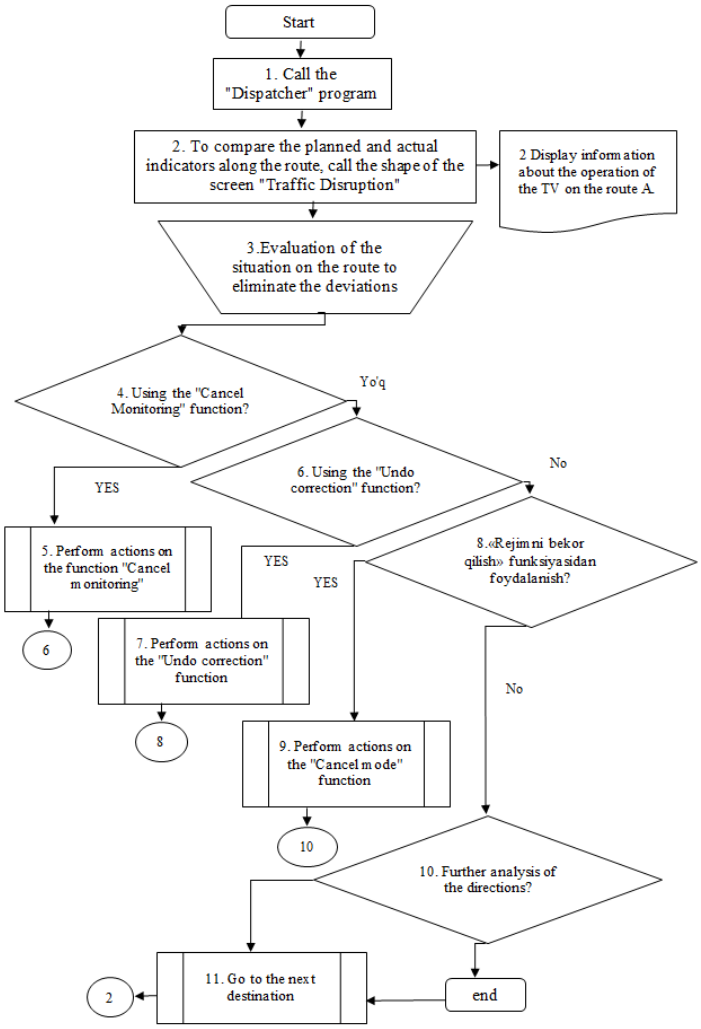

Figure 5. The structure of the implementation of certain elements of operational analysis and regulation of the process of passenger transportation in urban passenger transport.

The next action is to call the screen form and get quick information about the status of the transport process on the selected route. In the flow diagram, this motion is reflected in block 2.

The dispatcher then uses the received operational reference directly to analyze the situation on the selected route. Messages called "hot windows" can serve as additional information. In the flow diagram, this movement of the dispatcher is reflected in block 3.

Conclusion

It should be noted that all actions to analyze the situation, assess the situation and make a decision on the regulation of the transport process are carried out manually by the dispatcher. In the flow diagram, this is reflected in the form of block 3. This operation requires the highest skill from the dispatcher and is very time-consuming. In addition, in the opinion of the dispatcher, the dispatcher will try to regulate the transport process directly on the route. Blocks 4,6,8 reflect the sequence of checking the conditions for performing regulatory operations such as "cancel monitoring", "cancel correction", and "cancel mode".

If there is a positive solution in each block, the dispatcher acts as the corresponding function. The execution of this function is shown in the block diagram as a predefined procedure performed by block 5,7,9.

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