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Program and Target-Oriented and Situational Approaches in Management of Route Vehicles on Stopping Points

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Abstract

Many of the factors that determine capacity of a city traffic stopping points are well studied, however their effect and, mainly, their contribution improving or deteriorating the resultant effect are practically not explored. System accounting of the affecting factors and development of operative managerial solutions, based on the above, in line with the perspective (based on the program-and-target-oriented approach) depending on a situation at a stopping point is the potential method of the problem solution. “Packages” of administrative actions were developed and included sets of architectural – and – planning, technical, procedural – and – institutional, economic, information and other measures though having a restricted effect but which may be realized within tight deadlines and be able to ensure a quick result.

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Keywords: city traffic, route vehicle, stopping point, capacity, control, program and target-oriented approach, and situational approach.

1. Introduction

One of the first priority tasks specified in the Federal Target Program "Improvement of Road Traffic Safety in 2013-2020 envisage...elimination and prevention of dangerous road traffic segments, traffic jams and blocks..." [Government RF (2013)].

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Major time loss during road vehicles movement in cities is observed on the controlled road interchanges and street and road networks with street parking lots, stopping points and crosswalks. Less significant holdups are at non-controlled road interchanges and street and road networks with disordered pedestrian traffic on the carriageways, vehicles maneuvering (lane changing, exit/entry from the adjacent territory), insufficient side visibility, traffic sign "Speed Limitation" and artificial road waves [Khrapova (2010)]. Of all the varieties of the traffic hindrance in cities we'll consider only the stopping points of the city passenger traffic.

Analysis of publications of authors engaged in different years in consideration of the issues that relate somehow to the stopping point (L.L. Afanasiev, M.D. Blatnov, G.A. Varelopulo, E.P. Volodin and N.N. Gromov, V. D. Gerami, V.A. Gudkov, V.V. Grachev and I.P. Dimova, I.S. Efremov, A.V. Zedgenizov, N.A. Kuzmin and A.V. Lipenkov, P.A. Kulko , V.M. Kurganov, M.Yu. Marushko and D.A. Chizhov, L.B. Mirotin, A.Yu. Mikhailov, A. Rimkus, Yu.A. Ryabokon, R.G. Sanamov, I.V. Spirin, A.T. Taranov V.N. Fedotov, S.M. Khrapova, M.V. Khrushchev, G.A. Chernova, W.G. Atkinson, R. Fernandez, KR Jacques & HS Levinson, the authors of Manual Highway Capacity Manual of 2010 et al.), allowed to draw the following conclusions:

1. Many of the factors that determine capacity of a city traffic stopping points are well studied, however their effect and, mainly, their contribution improving or deteriorating the resultant effect are practically not explored.
2. The specific feature used in practice of a stopping point functioning models has the mechanistic approach to route vehicle drivers and their potential passengers. At the same time the "human factor" effect is rather significant and affects, for example, selection of route vehicle drivers at the stopping point, in front of or behind the stopping point, on selection of the route vehicle by a potential passenger for a trip on the basis of their inclinations and habits, on other "trifles" that are traditionally not taken into consideration but can affect significantly a route vehicle delay at a stopping point [Iskhakov and Rassokha (2007), Iskhakov and Rassokha (2008), Iskhakov et al. (2009), Iskhakov (2011)]. This is the main reason of deviations in the estimated and real indices for a stopping point capacity.
3. Attempts to solve the problem of improved capacity on the account of local changes (estimation of the "traffic lay-by"dimensions, etc.) do not lead to meaningful result. As a rule the architectural planning solutions are expensive and require for an alienation of the territories which are the most important city resource, therefore they are effective only in terms of the long-term perspective and are frequently impossible due to the existing urban development.

2. Results

State analysis of the evaluation tasks of a stopping point capacity allowed detecting 76 factors, affecting variously its value, which are the elements of "driver – vehicle – road – environment" system:

a) factors of subsystem "driver": *external* which is the external control of road vehicle operation procedure, road traffic intensity, fare collection procedure, the number of serviced routes (municipal bus or electric transport, commercial or mixed); *internal* (factors of a driver as an element of the ergatic system) including the work experience at route vehicle, psycho physiological state, professional training level, performance discipline level, selection of route vehicle stop location relative to the stopping point (if the "traffic lay-by" is available there or not), etc.;
b) factors of subsystem "vehicle": Route vehicle factor – design specifics (route vehicle type: electric transport or buses extra large, large, medium, small and extra small classes), the floor level height above the landing area of the stopping point, the number of "operative" doors, width of door openings, door opening system (automatic or manual), availability of payment terminals, allowable degree of cabin filling with passengers, additional devices to serve low-mobility groups of people; *factors of other vehicles* – passenger car – taxi (boarding – getting off, waiting for passengers, shopping stop in shopping pavilion, combined with a stopping point), truck (service of trade pavilion), etc.;
c) factors of subsystem "road", including its element "city passenger traffic stopping point; number of same direction traffic lanes, availability of a bus lane for route vehicles movement, distance to controlled and uncontrolled intersection, ground pedestrian overpass, road slope (rainfall discharge), geometric parameters of the stopping point, availability of "traffic lay-by" for a stopping point, the state of the traffic-bearing surface (ice, puddles, etc.) etc.;