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IMPROVING THE BUSINESS PROCESS OF ORGANIZING ROAD PASSENGER TRANSPORTATION ON THE EXAMPLE OF MINSKTRANS

СОВЕРШЕНСТВОВАНИЕ БИЗНЕС-ПРОЦЕССА ОРГАНИЗАЦИИ АВТОМОБИЛЬНЫХ ПАССАЖИРОПЕРЕВОЗОК НА ПРИМЕРЕ МИНСКТРАНС

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Аннотация. Для Минсктранс главной целью является удовлетворение населения в перевозках, а не получение прибыли, но для обеспечения рационального использования подвижного состава при организации пассажироперевозок необходимо проведение инжиниринга данного бизнес-процесса, чтобы спроектировать пути повышения экономической эффективности деятельности. В статье предложено ротатабельное планирование на основе автобусного маршрута №60, позволяющее сократить расходы предприятия на перевозку.

Abstract. The main goal for Minsktrans is to provide the general public with transportation rather than to make a profit. To ensure the rational use of rolling stock in the organization of passenger transportation, it is necessary to engineer this business process in order to design ways to increase economic efficiency of the activities. The article proposes rotatable planning based on bus route No. 60 which enables reduction of the company's transportation costs.

Ключевые слова: бизнес-процесс, инжиниринг, ротатабельное планирование

Key words: business process, engineering, rotatable planning

Introduction. Passenger transport is one of the main elements of the city social infrastructure which caters for the residents' needs in urban, suburban, intercity and international transportation. Reliable and efficient work of public transport for the city is the most important indicator of economic and socio-political stability.

The share of transport in the GDP of most countries ranges 4-9%, and in employment – 3-8%. These figures do not include individual and intra-company transport that further increases the importance of transportation service in the economy. Public urban passenger transport is widely regarded the most mass. It stands to reason that it accounts for up to 80% of all passenger transportation carried out in the country [1-2].

Main part. The use of business process engineering (BPE) technologies in the organization of passenger transportation at Minsktrans should ensure supply of rolling stock in accordance with the public demand, elimination of empty runs, minimization of costs and a more rational use of fixed and circulating assets of the enterprise.

The peculiarity of passenger transportation in the cities is that the number of passengers varies greatly depending on the time of the day. In the future, urban passenger transport will face a challenge to ensure further growth of transportation volume while reducing the time required to deliver passengers to their destination and, at the same time, increasing the level of comfort.

To identify places where there is a delay or a failure, decomposition of the road passenger transportation process is required which is presented with the IDEF0 method of graphical process description. The essence of IDEF0 is that business processes (functions of a real business object) are presented as a kind of transformation of the input flow into the output flow under the control (management) of actions or restrictions with the use of a special mechanism and resources for the transformation.

The second level of the IDEF0 diagram of the process provides an opportunity not only to track the results of each stage but also to estimate the required resources (using financial audit, simulation or economic and mathematical modeling).

For example, the first stage results in the staff being instructed and vehicles being prepared for departure. This step places demand on the condition of the vehicle as well as on the readiness of the staff for service. At the second stage, the input is the staff and vehicle prepared for departure and the output is the vehicle at the stop. At the third stage,

the input of the process is the vehicle at the bus stop and the output is people getting onto the vehicle to become passengers and so on.

At the fifth stage, the input is the paid fare, and the output is the passenger moving on the vehicle. At the sixth stage, the input is the passenger moving on the vehicle, and the output is the passenger having chosen a stop. The vehicle must stop at bus stops in accordance with safety requirements.

This article states the results of rotatable planning with bus route № 60 as an example according to which the information contained in the regression equation is evenly distributed on the sphere, so it is possible to build a plan that provides a model that predicts the response value with the same variance at all points of the factor space located at the same distance from the center. The value of the star shoulder for full factorial analysis is calculated by the formula:

$$d = 2^{k/4} \quad (1)$$

where k – the number of factors.

To form a reasonable route network of urban public passenger transport, it is necessary to determine the values and characteristics of passenger flows moving around town [3-4].

When studying passenger flows, the main parameters (factors) directly affecting their change are:

1) hour of the day (X_1);

2) day of the week (X_2);

3) month of the season (X_3).

The range of factor changes is significant. This leads to the emergence of a large number of options for various combinations of parameters. Thus, there arises a complex and time-consuming task to obtain statistical material on changes in passenger flows throughout the town. The solution of this problem by means of a continuous examination is practically impossible due to the significant labor intensity, hence the high cost of research. Thus, a mathematical model is needed that adequately describes the ongoing processes and makes it possible to obtain the necessary statistical material with minimal workload.

At the first stage, the regression equation is selected:

$$Q = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + ... + \beta_i X_i + \varepsilon \quad (2)$$

β_0 – absolute term that determines the value of Q, in the case when all explanatory variables X_i are equal to 0.

β_i– regression coefficients; Xi – factors. Variable factors (Xi) are: time of the day (X_1), days of the week (X_2), month of the season (X_3).

Finally, a multiple regression equation has been obtained: $Q = 8.3475 + 4.4499X_1 - 1.4467X_2 + 3.3217X_3$. An economic interpretation of the model parameters is possible: as X_1 increases by 1 unit of measure, Q increases in average by 4.45 units; as X_2 increases by 1 unit, Q decreases by an average of 1.447 units; as X_3 increases by 1 unit, Q increases by an average of 3.322 units. According to the maximum coefficient $\beta_1=0.475$, we conclude that the factor X_1 has the greatest influence on the result Q. The statistical significance of the equation has been verified using the coefficient of determination and Fisher's criteria. It has been found that in the situation under study, 36.58% of the total variability of Q is explained by the change in factors Xi.

Conclusion. Thus, engineering of the business process of the passenger transportation management with the example of Minsktrans, has made it possible to work out a technology for optimizing the route network which, using the example of bus route № 60, helped to reduce variable costs for the year in the amount of 14824,2 rubles.

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