

METHODICAL ASPECTS OF DETERMINING THE PROFITABILITY OF THE RAILWAY ROLLING STOCK OPERATOR

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Abstract: *This article analyzes and comparison of the various scientific and methodological approaches to determining the profitability of rolling stock operated by operating companies. We consider four different methods of profitability calculation, carried out their comparison revealed the advantages and disadvantages of each method. Recommendations on the field of application of each method.*

KEYWORDS: PROFITABILITY, ROLLING, ROLLING STOCK OPERATOR, METHODOLOGY.

1. INTRODUCTION

Preserving stability in the market and the success of the enterprise depends on a clear understanding of - what types of products and some units offer a large profit, and what - are detrimental to efficient business enterprise. Costs and revenues, and the relationship between them, are two key aspects that ultimately determine the railway's future position in the freight transport market [1]. An investment in the rail sector represents costs and benefits for a wide range of institutions, companies and individuals. Actual flows of cash constitute the basis for the financial assessment of the project [2].

Identify errors in the work schedule of profit growth and to identify ways of further development of reserves helps to analyze profitability of the enterprise. The yield can be regarded as a general indicator of economic efficiency of the business processes of the organization.

What is the yield?

Based on different user, owner, and stakeholder expectations, the quality of the rolling stock can be defined in many ways [3]. According to the definition given number of sources (eg, - "BusinessTimes" - magazine about business in Russia and abroad), the yield (Yield), or rate of return - used in the economy (in finance) a relative measure of efficiency investments in certain assets, financial instruments, projects or business in general. Yield can often be classified as the ratio of the absolute value of income to a base, which is usually the amount of initial investments or investments to be carried out for this income.

The financial stability of the enterprise is entirely dependent on the sustainable development of its business activities. Currently the rolling stock industry is facing heavy consolidation pressure due to large global overcapacity [4]. For example, if railway achieves financial sustainability when it has sufficient longer-term financial resources to cover operational costs, to invest, and to meet debt service and other financing requirements [5]. In the US, rail operators have seen an accelerating decline in high margin coal business and McKinsey reports that none of the larger European carriers have achieved average margins of 3% in earnings in recent decades, and at least 7% is needed to cover their costs of capital [6]. Research shows that effective price management can increase margins by 2 to 7% within 12 months, and yield a 200 to 350% return on investment [7]. That is why an important condition for this is a professionally competent and timely implementation of the process of determining the yield to accurately describe the perspectives of the relevant investment or management decisions and is an effective mechanism for evaluating the profitability of transport operator.

2. PROBLEM STATEMENT

Speaking about profitability in the field of railway transport services operator examines the profitability of rolling stock - a relative indicator of the efficiency of rolling stock per day, defined as the ratio of the difference in revenue from transportation and relocation costs for empty wagon to wagon turnover.

On the basis of the definition that the profitability of the car work affects revenues from transportation, the cost of relocation of the empty car and the car turn.

Proceeds received from the transport operator, formed the basis of a carload component, taking into account the level of mark-up / discount rate to 10-01 Price List and is set per tonne of cargo carried in the car, or for a loaded one wagon-sending.

Costs of the operator in this case are the costs of empty runs of the car calculated in accordance with the Price List 10-01.

Wagon turnover is defined as the average time in days for which the car passes a distance equal to its full flight, taking into account the duration of parking in the loading / unloading stations.

At the present time, it has become imperative for rail systems to optimize the fleet size and freight car allocation in the presence of uncertainty. The problem can be considered as the problem of finding an optimal fuzzy regulator for a fuzzy linear system with fuzzy quadratic performance index and fuzzy random initial conditions [8]. Developed dynamic model of loaded and empty rail freight car flows explicitly treats state, control and station capacity constraints in presence of various freight car types under the partial substitutability among them. Demands and traveling times are considered as random variables [9].

Planning the structure and volume of the rolling stock is a key factor in achieving maximum efficiency of transportation by rail as well as forecasting the demand for these transport facilities [10].

The definition of rolling stock yields helps to assess the potential of optimizing freight operator base and, by ranking customers, allowing time to identify unprofitable transportation.

Income calculation of the car is possible by using several approaches, each of which corresponds to the basic questions:

1. What level of profitability provides a specific kind of rolling stock?

2. What is the rate of return provides a specific transportation / direction of transportation?

Wagon yield is calculated on a separate branch of the rolling stock. In this case the total revenue from the operating activity of the subject kind of rolling stock (hereinafter - RPM) minus the total cost of relocation of empty wagons considered RPMs divided by wagon-day.

In determining the profitability of operators in the costs can account for the different set of empty runs: one account for all the costs associated with empty flights, others - in costs do not account for empty flights to repair, attributing these costs for the maintenance of rolling stock, etc ..

The objective function of maximizing the average daily financial result relies heavily on the integration of logistics activities with an improved management of revenues. The operational policies chosen by the carrier have an important impact on the network yield and thus on global profitability [11].

In determining the wagon-days (the product under review, the park RPS operator the number of days in the reporting period) - and there are several approaches:

- Take into account the whole wagon-day inventory / usable / working park operator;

- Are not considered wagon-day related to the dregs.

In practice, operators expect to yield:

- The entire park operator wagons, i.e. total fleet operators of cars that are in operating;

- Fit cars park operator, i.e. wagons that may be repaired and used in operations, defined as the sum of non-working car fleet and working;

- Working park operator wagons - wagons, technically sound for the transportation of goods and used by the operator to provide transportation in accordance with the plan and requests of customers.

In general it can be noted that the methodological definition of return on CPF quite clear, and the variation calculation enables the operator to assess the impact on the profitability of individual factors such as the level of non-working of the park, the number of cars in the sludge and their impact on profitability, etc.

3. METHODS OF SOLUTION

Based on the need to assess each individual transportation, there are 2 questions to the operator:

Which revenues should bring the carriage to pay the total cost for the maintenance of rolling stock to ensure it? Total costs include costs associated with the maintenance of the car (including current and planned repairs), the costs of maintaining operating

$$D = \frac{(\sum B_1 - \sum C_1) - (\sum B_2 - \sum C_2)}{(T_1 - T_2)}$$

In determining the turnover account

$$\sum C_1, \sum C_2, T_1, T_2$$

the car.

This method for determining yields for calculating the yield of the turntables (i.e. traffic returning to the loading station) as well as for the specialized rolling stock, which is usually drawn on a closed landfill and has empty run is equal to or close to unladen.

A significant advantage of the method is its simplicity of calculation and the minimum level of automation.

A significant drawback of this method is the inability to determine the level of profitability for optimizing traffic (i.e. "free" primary direction of following empty car traffic) and transport in complex logistics schemes (for example, universal rolling stock). Also, this method does not allow to determine the yield on the client as a whole.

Despite these shortcomings, the method is one of the common and is used by most operators.

3.2. Determining the yield based on previous unladen journey

$$D = \frac{(\text{revenue} - \text{costs por.reys previous})}{(\text{wagon turnover})}$$

where *the costs of the previous day. flight* - the costs associated with overseeding of empty wagons for carriage in the direction being considered.

In determining the turnover accounted wagon laden voyage and the previous empty runs. Thus, the turnover of the car in this case is calculated from the end of the previous discharge laden voyage to the end of discharge calculated laden voyage.

3.3. Determination of return by calculating it in the logistic scheme

This method is rarely used in practice, because of the complexity of billing the client on a wagon subfamily costs, especially in the period of balance or surplus rolling stock, as Determination of return by calculating it in the logistic scheme:

$$D = \frac{(\sum B_1 - \sum C_1) - (\sum B_2 - \sum C_2)}{(T_1 - T_2)}$$

where revenue $\sum B_1, \sum B_2$ - total revenue respectively, against all loaded flights included in the logistic scheme under consideration with a freight transport and without it;

company staff and direct costs of the subfamily under the carriage or transportation after removal of the empty wagon, etc.

What are the direct costs attributed to the considered transportation?

For the answer to both questions is in practice used alone or in combination, are some basic methods for determining the profitability of transportation.

Let us consider in more detail each of the 4 main methods of calculating the profitability of transportation:

3.1. Determining the yield based on the next flight or the empty set of the following empty flights

$$D = \frac{(\text{revenue} - \text{costs subsequent por.reys})}{(\text{wagon turnover})}$$

where *revenue* - revenue received by the operator of the transport in a particular direction (mainly depends on the RPS, the direction of transportation, cargo / cargo class);

the cost of the subsequent empty flight - the costs associated with the relocation of the empty carriage after the carriage in the direction being considered.

wagon laden and unladen subsequent flight of

$\sum C_1, \sum C_2$ - respectively, the total cost of all the empty flights included in the supply chain with consideration laden transport and without it;

T_1, T_2 - respectively, the time spent on the passage of cars of all chains logistic schemes considered a freight transport and without it.

Under the scheme is a sequence of logistic supply chains, which consist of loaded and empty flights. Logistics scheme begins and ends at the same station or loading region (eg, for the gondola Kuzbass). Thus, the rate of return on the 3 method is determined by comparing the logistics schemes under consideration transport and without it.

The main advantage of this method is the possibility of obtaining an answer to the question of the profitability level for any RPM, and in many areas, including optimization. This method can be applied to operators with regional logistics and transport with stable traffic areas.

For network operating companies and organizations that actively involve the new transportation from the market, a significant drawback of the method is the inability to perform the correct calculation for the entire logistics operator. For example, there is the possibility of uncontrolled referring to the optimization of direct transportation of a large amount of car traffic volume; logistics scheme operator not linked with each other; optimization options for calculations and linking logistic schemes are not computed. In addition, staff are required to the same understanding and deep knowledge of the logistics operator traffic, linking their settlements with a total logistics company - this requires an appropriate level of automation.

Despite the presence of serious adverse moments 3 method is the most accurate of the above in terms of determining the profitability of transport, but even with the appropriate level of automation it will concede 4 calculation method.

3.4. Method for determination of profitability by converting the entire logistics operator with the use of optimization models

The basis of the method - calculation of optimal logistics operator, taking into account the entire cargo base (option 1) and without consideration transportation or customer (option 2). This method is determined by the impact of the considered transport or

client on profit margins throughout the cargo base, the yield is calculated.

In fact, the method simulates a situation in which the considered transport / client would not be in the cargo operator based. Thus, it is possible not only to assess the transport, but also the client as a whole, to identify ways to improve the logistics operator.

The answers to these questions form the basis of mismatches ("gaps") between schemes zaadresatsii empty wagons to the facts of their relocation. These "gaps" due to the following reasons:

- The Convention's prohibitions on over seeding cars in the region of loading;

- Errors in the management of fleet cars;
- Rapid change in customer service technology.

A significant advantage of the method is the possibility of determining the existence of discrepancies between the actual management of the park empty wagons and optimization calculations that allows for management decisions aimed at eliminating suboptimal over seedings of empty wagons. Also, this method allows for the ranking of the client portfolio on profitability and make decisions aimed at:

- Changes in cargo base by searching transport, improve logistics;

- Change the principles zaadresatsii empty wagons for loading operator, including with measures aimed at reducing car traffic;

- Changes in pricing conditions in certain areas for the elimination of unprofitable operations;

- Refusal of transport.

The disadvantages of this method is the complexity of the calculations, and the presence of diverse geography of transportation - a significant length of computation (from tens of minutes to several hours). These drawbacks are solved by automating the calculation.

4. CONCLUSIONS

Thus, the first three methods of determining the yield can be used for rapid analysis and only if all the following conditions are met:

- No optimization model for calculating the logistics operator;

- The operator has a fleet of no more than 30 thousand cars;

- The operator is working on the free market, i.e., park operator wagons are not fixed service contracts;

- The operator is presented only in a limited range network - operator with limited transportation logistics.

The fourth method - at the appropriate level of automation - is used for the integrated assessment of the operator's activities well as - the complexity of predicting the direction of the subfamily of empty wagons.

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