

Forecasting as an Element the Activity Development of a Sports Organization

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Abstract

In this article, the authors have investigated the possibility of correlation and regression analysis for financial forecasting of sports and physical culture organizations. The purpose of this research is to develop tools and use them in forecasting performance indicators of sports industry organizations for their stable functioning in the market. The relevance of the topic is due to the fact that the sports business in Russia is relatively new, the activities of sports and physical culture organizations are associated with the influence of a sufficient number of factors that negatively affect the performance of activities. For this purpose, the authors suggest using a correlation-regressive analysis of profit. The factors that influence the profit were determined and a multi-factor regression model was constructed that allowed calculating the forecast value of profit. The assessment of the impact of three factors on profit was revealed using data of ten organizations.

Keywords

Correlation and Regression Analysis, Financial Forecasting, Profit, Sports and Fitness Organization, Sports Business.

Introduction

Close attention to sports management is currently justified by the fact that sport, which has become a part of business in Russia, is becoming attractive to businessmen, investors, etc. At the present stage of development of sports management, a different, private model is being implemented-based on self-government and self-sufficiency, self-financing and rapid modification of the concept of sports business. The sports and gaming industry and eSports have emerged and are actively developing. Their functioning is rapidly changing the sports business. The strategic documents approved in Russia are aimed at creating a competitive sports industry. The sports industry in the world is developing in an upward direction, and the market turnover has reached one hundred billion dollars. The reasons for this growth are the growth in the number of people involved in sports and the use of digital technologies in the industry. Hence, the increase in financial investments in the development of sports business in general, and the state's desire to create a favorable environment for its development. With a competent approach to the development of this sector of the economy, sports business will not only bring a decent return, but also improve the indicators of life expectancy and working capacity.

Consideration of issues related to forecasting and financial stability of sports organizations will make it possible to implement business more competently and taking into account the influence of factors on their activities.

Literature Review

At the present stage of society's development, sport is one of the main segments of the global economy, which includes both the competition system and a set of organizational, economic, informational and political factors that influence different communities.

The range of issues in the subject area of management of investment and financial activities of sports organizations is very wide, as evidenced by a number of publications by Russian and foreign authors. The essence of the author's reasoning and analytical conclusions is to identify the features and differences in making investment decisions in the sports industry.

Thus, the issues of financing sports organizations and the industry as a whole are considered in the works of foreign authors: Trevor Slack, Neil King, Hans Westerbeek, G., Milan Tomic, Phil Schaaf, Grazia Lang etc. The authors consider the issues of transformation of sports organizations and their financing conditions in the modern sports business environment.

The issues of formation and functioning of sports business organizations, the effectiveness of sports organizations and the investment attractiveness of sports projects can be found in the works of domestic authors: A.V. Pochinkin, S. G. Seiranov, L. V. Aristova, P. Y. Voronin, C. I. Guskov, L. V. Zhestyannikov, V. I. Zholdak, Yu. A. Zubarev, V. V. Kuzin, M. E. Kugepov, M. L. Mitrofanov, etc. The authors consider the problems of budgeting in the financial management system of sports organizations.

Methodology & Results

Modeling is used to optimize the production process in the information space. A certain amount of information is required for modeling and solving economic and mathematical problems. This is information about resources and their availability, production, distribution, exchange, and consumption processes. The variety of forms of economic information is collectively called economic data. Data processing is important for making optimal decisions. Economic information must meet certain requirements. It must be reliable and correctly reflect economic processes. It must be processed using scientific methods using an application software package. The information should be economical and contain only the necessary data, prompt, and should provide maximum opportunities for calculating derived indicators and characteristics.

To study the profit of commercial sports and physical culture organizations, we will use correlation and regression analysis. For ten sports institutions, data were obtained (table 1) describing the dependence of the profit volume Y (RUB) on the amount of revenue from season-ticket groups X1 (RUB), on the revenue from sales of souvenirs and sales in the bar X2 (RUB), on the pass-through function X3 (people).

Table 1. Data on the activities of sports organizations

№	Profit (RUB)	Revenue from season-ticket groups (RUB)	Revenue from Souvenirs (RUB)	Pass-through function (people)
1	11314286	7920000	948571	5765
2	12728571	9110000	994643	4832
3	15557143	11890000	1076678	6089
4	16356281	11821000	1075919	5432
5	14274862	9351600	1049216	5871
6	10274627	7826000	832138	3549
7	10368621	8212000	759165	2533
8	14874612	8639000	950572	3811
9	14142857	9900000	960711	3546
10	12021429	8815000	851607	4483

To build a multi-factor regression model, you need to select factor features, and to identify multicollinearity, you need to analyze the coefficients of pair correlation between factor features. Table 2 shows the coefficients of pair correlations calculated using the Excel application package.

Table 2. Table of coefficients of pair correlations

	Y	X ₁	X ₂	X ₃
Y	1			
X ₁	0,848599523	1		
X ₂	0,859087444	0,760964	1	
X ₃	0,509377477	0,51027	0,812571	1

As $r_{X_2 X_3} = 0,812571 > 0,8$, i.e., if there is a multicollinearity phenomenon between factor attributes X_2 and X_3 , then to build the model, we choose the factor attribute that has a greater influence on the resulting attribute (a factor for which the coefficient of paired correlation with the resulting attribute, taken modulo, is larger).

$$|r_{YX_2} = 0,859087444| > |r_{YX_3} = 0,509377477|$$

So, factor X_2 has a greater influence on the effective attribute Y, and it is recommended to leave this factor in the model. Factor X_3 has less impact on the effective attribute Y, and it is recommended to exclude this factor from the model.

Thus, two factor features are selected for building a multiple regression model – X_1 (amount of revenue from season-ticket groups) and X_2 (revenue from souvenir sales and bar sales).

Then the multiple regression equation has the form of:

$$Y = -2883517,09844364 + 0,682521630216973X_1 + 10,2053851150152X_2$$

Let's evaluate the quality of the constructed multiple regression model using the following indicators:

Coefficient of determination $R^2 = 0,828241$ it is close enough to 1, so the quality of the model can be recognized as high, and the model can be used for practical purposes.

When checking the significance of the regression model, we use Fischer's F - criterion. As $F_{\text{estim}} = 16,87739 > F_{\text{crit}} (\alpha=0,05; k_1=2; k_2=7) = 4,74$, consequently, the regression equation is recognized as statistically significant and can be used for analyzing and predicting economic processes.

Let's evaluate the quality of the constructed multiple regression model using elasticity coefficients, β - and Δ - coefficients.

The elasticity coefficient is calculated using the formula:

$$\varepsilon_i = b_i \cdot \frac{\bar{X}_i}{\bar{Y}}, (1)$$

where \bar{X}_i - is average value of the corresponding factor attribute;

\bar{Y} - is average value of the result attribute;

b_i - regression coefficients of the corresponding factor features.

Coefficient β is calculated using the formula:

$$\beta_i = b_i \cdot \frac{\sigma_{X_i}}{\sigma_Y}, (2)$$

where σ_{X_i} - is a root-mean-square deviation (RMSD) of the corresponding factor attribute;

σ_Y - is a root-mean-square deviation (RMSD) of effective feature;

Coefficient Δ is calculated using the formula:

$$\Delta_i = b_i \cdot \frac{r_{YX_i}}{R^2}, (3)$$

where r_{YX_i} - is the coefficient of pair correlation of the effective and corresponding factorial features;

R^2 – is the coefficient of determination.

The results of the corresponding coefficients are shown in table 3.

Table 3. The results of the calculations

	Y	X ₁	X ₂
Average value	13191328,9	9348460	949922
RMSD	2163017,964	1467113,032	107417,8689
ε_i		0,483690931	0,734900927
b_i		0,682521630216973	10,2053851150152
β_i		0,462934842	0,506810733
r_{YX_i}		0,848599523	0,859087444
Δ_i		0,474313981	0,525686047

Private elasticity coefficient ϵ_i shows the percentage change of the average value of the resultant variable if the mean value of a particular factor variable changes by 1 %, i.e., increasing by 1% value of the revenue from subscription groups (X1), the profit volume will increase by 0.484 % ($\epsilon_1 = 0.484$), while increasing by 1% the amount of revenue from sales of souvenirs and sales in the bar (X2), the profit volume will increase by 0.735% ($\epsilon_2=0,735$).

The coefficient β shows by what amount the effective indicator's RMSD will change if the RMSD of a specific factor indicator changes by 1 unit, i.e. if the value of revenue from season-ticket groups increases by 1 unit (X1), the profit volume of the RMSD will increase by 0.463 ($\beta_1=0.463$); if the revenue from sales of souvenirs and sales in a bar increases by 1 unit (X2), the organization's profit margin will increase by 0.507 units ($\beta_2= 0,507$).

The coefficient Δ shows the share of the influence of a specific factor attribute in the combined influence of all factor attributes on the performance indicator, i.e. the share of the influence of the value of income from subscription groups (X1) on the volume of profit (effective attribute) is 47.4% ($\Delta_1 = 0.4743$), and the share of revenue from sales of souvenirs and sales in the bar (X2) on profit is 52.57 % ($\Delta_2 = 0.5257$).

To make a forecast of the profit of a sports organization (a performance indicator), we will use the multiple regression equation, since the quality of this model is recognized as good.

To make a forecast of the effective feature, one need to calculate point forecasts of factor features (the amount of revenue from season ticket groups and the amount of revenue from sales of souvenirs and sales in the bar). To do this, we will plot a graph X1(t), X2(t) and the trend for each of the factors.

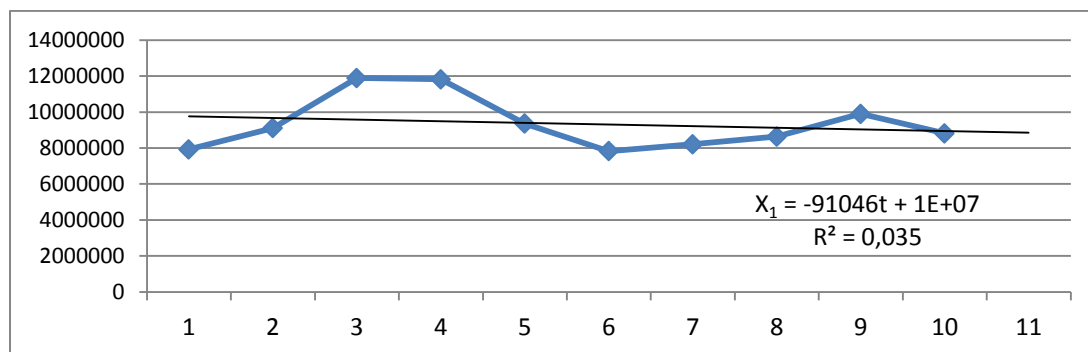


Figure 1. Forecast the amount of revenue from season-ticket groups (X1).

Forecast value X1(forecast) is equal to 8998494 rubles.

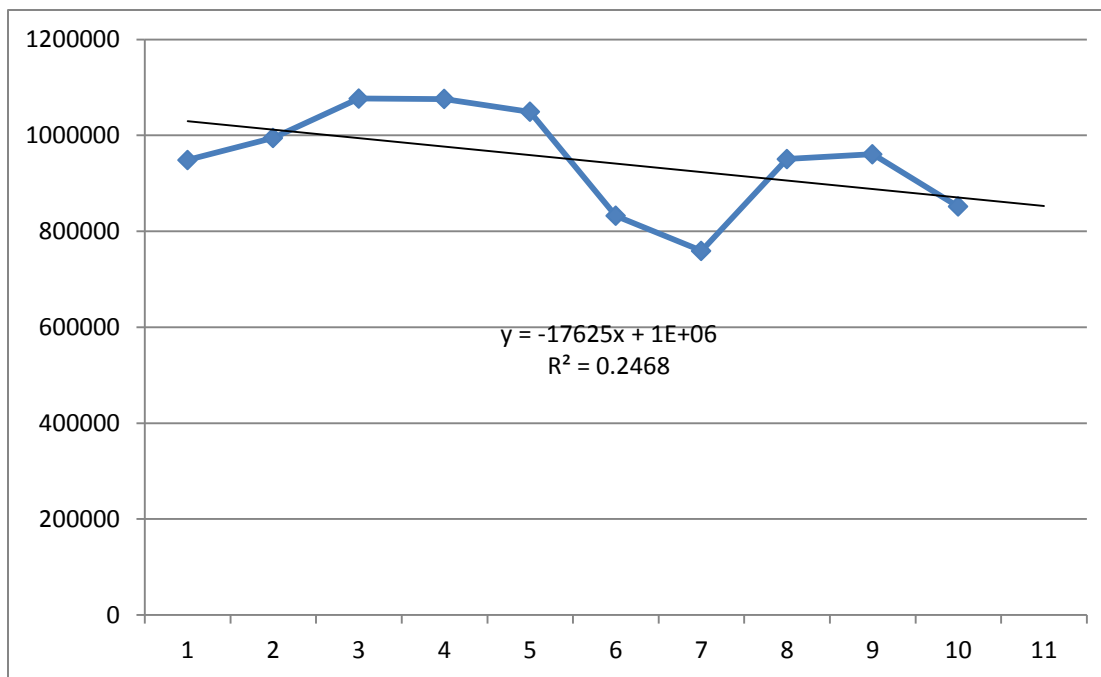


Figure 2. Forecast the value of sales of souvenirs and sales in the bar (X2).

Forecast value X2 (forecast)= 806125 rubles.

The forecast profit value of a sports organization is equal to:

$$Y(\text{forecast}) = -2883517,09844364 + 0,682521630216973 * X_1(\text{forecast}) + 10,2053851150152 * X_2(\text{forecast}) = 7827131 \text{ rub.}$$

For an interval forecast of the resulting indicator, you must calculate the width of the confidence interval, which is calculated using the formula:

$$U(k) = S \cdot t \cdot \sqrt{1 + \frac{1}{n} + \frac{(Y(\text{forecast}) - \bar{Y})^2}{\sum(Y - \bar{Y})^2}} \quad (4)$$

Standard error: is S=1016464,19; Student's coefficient is t (α=0,005; k=7)= 2,364624.

$$U(k) = 1016464,19 \cdot 2,364624 \cdot \sqrt{1 + \frac{1}{10} + 0,6933557} = 3209764,455$$

The forecast profit value will be within the following limits:

$$(Y (\text{forecast}) - U (k); Y (\text{forecast}) - U (k)).$$

The forecast value of the profit of the studied commercial sports organizations based on multiple regression will be in the range from 4617366.545 rubles to 11036895.46 rubles.

Conclusion

The increase in demand for goods and services of the sports sector of the economy should be compensated by the supply, and hence the comprehensive support of the state and the desire to have a high-yield stable functioning industry, and all the prerequisites for its demand are there. This means that joint overcoming of problems in the sports industry is extremely profitable for both the state and business.

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