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Econometric Assessment Models Creation of Problems and Prospects of the Municipal Museums Development

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Abstract

The museum field of activity which was earlier rather not often acting as economic and statistical researches object even more often becomes an object of attention, discussion and studying in recent years. In this article the research of factorial communications of the municipal museums activity based on the Correlation and Regression Analysis (CRA) is conducted. The problems assessment econometric models and prospects of museums development of the municipal areas in the Samara region are constructed. CRA was performed using the application package "STATISTICA 10.0". On the basis of the study concluded that the indicators of social efficiency of municipal museums play the most prominent role in shaping the impact of museum activities in the municipalities of the Samara region.

Keywords: Econometric Models, Efficiency of Museum Activity, Factorial Communications, Municipal Museums

1. Introduction

The main feature of the XXI century museums is their versatility. Today the museum is the difficult multilevel system solving a number of socially significant problems among which more prominent position takes art leisure, integration of cognitive and moral and patriotic activity.

Museums play an important role in the modern world, not only in meeting the cultural needs of the people and as a place of leisure - and they also act as a driving force of social and economic development of the area, the revitalization of the related industries (tourism, hospitality), which creates a definite multiplier effect and increases the investment appeal of the place, which houses one or another museum institution[1].

In assessing the effectiveness of municipal museums is necessary to apply a multilateral approach to the issue of innovative forms of cooperation between the historical and cultural heritage and socio-economic policy in the region. Methodological aspects of this approach are discussed in a number of papers[2-5]. However, the phenomena and processes of the regional economy and the social sphere are rather known only in the case, along with substantial analysis of their essence manages to quantify their usual objective laws and relationships. The main fundamental contribution to the development of econometric methods for analyzing discrete choice is developed in 1974 Nobel laureate in economics McFadden, D. Logit model, the essence of which is that in the life of every person there are certain alternatives which determine the most useful individual choice[6]. Attempts to use the machine regression analysis to study the factors determining the development of cultural spheres were made relatively recently[7-10]. Studies of this kind are few. In our work we focus on the construction of econometric models for assessing the problems and prospects of municipal museums development in the Samara region.

2. Materials and Methods

2.1 Factors Determining the Municipal Museums Effectiveness Included in the Regression Model

One of the most important aspects of the mathematical and statistical tools application to assess the problems

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and prospects of municipal museums development in the Samara region - the linkages in the form of statistical regularities.

Features of district museums are such that the relationship between the information and cultural, socioeconomic and patriotic can be studied using the theory of allowing these relationships and communication to identify and quantify. As the object of the museum activities simulation efficiency in the areas of the Samara region we consider complex partial indicators, which in their interaction give a certain impetus to the development of museums:

Y1 – The number of museum visitors (thous. people);

Y2 – Share of excursion visits by persons under the age of 18 years (% of the total number of the museum visitors);

Y3 – Income from statutory and business activities based on sq. m of the exhibition space (thous. rub.).

The specifics of the simulation object are determined not only by the composition of dependent variables, but also a set of factors defining them. As a result, the logical considering a wide range of symptoms of factor produced the following composition factors, the arguments most closely associated with the simulated values:

X1 - the population of the service area (thou. pers.);

X2 - the number of exhibitions (units);

X3 - the number of events the museum (units);

X4 - number of educational programs (units);

X5 - income (thous. rub./specialist);

X6 - the number of experts (pers.);

X7 - exhibition space (sq. m);

X8 - the average salary of a museum employee (rub./month).

We chose an approach, consisting of a detailed analysis of the pairwise correlation coefficients matrix between the dependent variable and all considered factors, arguments and detection of collinear (interrelated) factors, one of which should be excluded from the factors. The idea of a multi-step analysis is calculated in a number of iterations, during which the consistent inclusion of all the selected models using theoretical analysis of factors and evaluation at each step of the calculation steps significant impacts on the performance of all the factors taken into account and the model of convergence results. The factors were insignificant and do not contribute to improving the convergence between the calculated and actual values of resultant variable omitted and replaced with new.

2.2 Creation of Econometric Models

As a result of the multi-step regression analysis, multiple regression equation territorial levels of attendance museums population of the Samara region are characterized by the expression:

$$Y_1 = 4229{,}036 + 28{,}837X_3 + 42{,}078X_4 + 279{,}443X_6 - 5{,}583X_7,$$

Options which means that an increase in the number of events on the 1 unit the number of visitors to the museum will increase by an average of 29 people; with an increasing number of educational programs on 1 unit is an increase in the number of visitors to 42 people; increasing the number of specialists for 1 person also increases museum visits on average 279 per year; and finally, increasing the exhibition area of 1 sq. m. the number of visitors decreases by an average of 6 people.

All regression coefficients are significant by Student's test. Multiple correlation coefficient R was 0.992, the square of this value means that the variation of resultant variable by an average of 98% is explained by the variation factor variables included in the model.

We will find elasticity coefficients:

$$\acute{Y}_i = a_i \times \frac{\overline{x_i}}{\overline{y}},$$

Where a_i – regression coefficients;

$\overline{x_i}$ - average value of a sign X_i.

$$э_3 = 28{,}837.\frac{51{,}286}{8457{,}143} = 0{,}174$$

$$э_4 = 42{,}078.\frac{4{,}429}{8457{,}143} = 0{,}022$$

$$э_6 = 279{,}443.\frac{4{,}286}{8457{,}143} = 0{,}142$$

$$э_7 = -5{,}583.\frac{252{,}571}{8457{,}143} = -0{,}167$$

Thus, with an increase of 1% in the number of public events and educational programs conducted by the museums of the Samara region, and number of specialists the number of visitors increased by an average of 0.174% to 0.022% and 0.142%, respectively. Finally, the number of museum visitors will decrease on average 0.167% with the growth of the exhibition area.

The coefficients of the regression equation in natural

scale are not comparable with each other because of differences in the scale measure factors-arguments. They use the original role of standards in the assessment of the effectiveness of the adoption of certain management decisions and are quite acceptable in the development of socio-economic development and in the implementation of short-term and long-term forecasts.

β - coefficients have a single standardized scale, so we form the regression equation in a standardized scale:

$$y = \beta_3 x_3 + \beta_4 x_4 + \beta_6 x_6 + \beta_7 x_7; \quad \beta_i = a_i \frac{\sigma_{x_i}}{\sigma_y},$$

where σ_{x_i} - average quadratic deviation of a sign X_i;
σ_y - average quadratic deviation of a sign Y.

$$\beta_3 = 28{,}83\frac{87}{5433} = 0{,}489$$

$$\beta_4 = 42{,}078\frac{3{,}44}{5133} = 0{,}028$$

$$\beta_6 = 279{,}433\frac{1{,}29}{5133} = 0{,}07$$

$$\beta_7 = -5{,}583\frac{143{,}98}{5133} = -0{,}157$$

$y_1 = 0{,}489x_3 + 0{,}028x_4 + 0{,}07x_6 - 0{,}157x_7$

Comparing the β- coefficients in absolute value, we conclude that the greatest impact on the number of visitors to the municipal museums of the Samara region has a factor X3 (number of events), then the X7 (exhibition area) and X6 (number of experts), and the least affected by X4 (number of education programs). This coincides with the conclusions of the coefficient of elasticity.

The leading role of museums attendance is determined not only by the fact that attendance has a direct component of the effectiveness of municipal museums, but also by the fact that another of its components - the share of excursion visits by persons under the age of 18 years is one of the strongholds of spiritual and moral development, and patriotic education of children and youth.

The model of visits to museums' excursion by young people has high coefficient of multiple correlation R=0,983.

$$Y_2 = 87{,}744 + 0{,}032X_1 + 0{,}06X_2 + 0{,}02X_4 + 0{,}46X_6.$$

The variation of resultant variable to 96, 7% is influenced by four factors included in the model.

In contrast to the above model is among the factors, the arguments present demographic factor.

The resulting model parameters indicate that with the increase of population per 1 thousand people, the number of exhibitions on the 1 unit, the number of educational programs at 1 unit, and number of specialists per 1 person - the percentage of visits to museums Samara region youth will increase by 0,032%, 0,06%, 0,02% and 0,46% respectively.

The third model describes the Income from statutory and entrepreneurship. It includes four factors:

$$Y_3 = -1905{,}45 + 1{,}796X_2 + 1{,}123X_5 + 0{,}172X_7 + .0{,}241X_8.$$

The analysis showed that income from statutory and entrepreneurship will increase by 1,796 rubles by increasing the number of exhibitions 1 unit; with an increase in revenue per specialist per 1 thousand rub. museum of income will increase by an average of 1,123 rubles.; by increasing the display area per 1 sq. m. of the museum income will increase by 172 rubles, while increasing the average wage employees of the museum for 1 thousand rub. revenue increase by 241 rubles.

Multiple correlation coefficient R = 0,976, the total coefficient of determination shows that the variation of resultant variable by an average of 95, 3% is explained by the variation factor variables included in the model. The income from the statutory and business activities more elastic with respect to income attributable to one expert. The growth of this factor variable by 1% leads to an increase in the effective sign of 19,022%.

With β-coefficients evaluate the priority of factors, arguments on a productive sign of the effectiveness of constructed models of municipal museums in the districts of the Samara region, placing them in the following order:

Model 1: $\beta_3, \beta_7, \beta_6, \beta_4$.
Model 2: $\beta_1, \beta_2, \beta_4, \beta_6$.
Model 3: $\beta_5, \beta_7, \beta_2, \beta_8$.

3. Results

In general, by results of the carried-out correlation and regression analysis it is possible to draw a conclusion on continuous influence of the factors, characterizing social efficiency, on features of the municipal museums activity of the Samara region. This type of analysis makes it possible to realize the logic of action of the main factors

of development of museums, to quantify their impact, to understand what factors and in what proportion, and perhaps should be changed to improve the effectiveness of museums, as well as to assess the problems and prospects of the regional museums development in the Samara region[11,12].

4. Discussion

The museum field of activity which was earlier rather not often acting as economic and statistical researches object even more often becomes an object of attention, discussion and studying in recent years.

From the point of view of statistical analysis should be noted that many indicators museum sphere essentially immeasurable because the effect of these parameters only subjectively perceived and can be uniquely expressed in the physical parameters. Therefore, the development of museum activity and effectiveness of the services provided by it can be measured only indirectly through related indicators of the real sector. In this regard, the need for data characterizing the activity of municipal museums stimulates the activity to develop a fundamentally new statistics.

Our research has practical significance of the results that may have practical importance as a means of information support in the development of socio-economic development of regions. In addition, they can assist municipal administrations in the governance of cultural institutions, be used in the scientific staff of museums, research and training and educational activities in the development and reading courses on the economic history of the Volga and Samara region for students of humanities specialties.

5. Conclusion

On the basis of the study can be seen that the indicators of social efficiency of municipal museums play the most prominent role in shaping the impact of museum activities in the areas of the Samara region. Despite the positive dynamics of growth in the number of visitors, the quality and quantity of cultural programs should be related to the needs and interests of society[12-14]. Specifically, the activities of museums should be directed, first, the implementation of the main objectives identified in the framework of state programs, and secondly, to develop economic and institutional mechanisms for their implementation. In addition, the process of urbanization leads to an outflow of young professionals, aging working population area, which leads to lower employment of citizens, especially in the museum industry.

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