COMPUTATIONAL MATHEMATICS

STATISTICAL STUDY OF THE PAID SERVICES MARKET SITUATION TO IMPROVE THE ACTIVITY OF AN ENTERPRISE

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The article presents a statistical study of the situation of educational paid services market in Russian Federation. A feature of our study is the fact that the analysis is carried out on the example of a typical organization that provides paid educational services on the market, i.e. an organization from the small business sector. This fact is also a significant limitation due to the fact that official statistical information about small business organizations is not enough. This question is currently very relevant. In order to analyse the situation of educational paid services market, we use a trend forecasting method in relation to the autonomous non-profit organization of additional professional education "Center for Advanced Studies "BUSINESS SEMINARS" (hereinafter ANO APE CAS "BUSINESS SEMINARS"). The purpose of this analysis is to determine the economic situation in the market of paid educational services as the basis for developing tactics and business development strategies for the future.

Keywords: organization; market situation analysis; market of educational paid services; trend method; least squares method.

Introduction

The need for expansion of the educational infrastructure is conditioned by the intensive development of entrepreneurial activity, the entry of the majority of international corporations to the Russian market, the growing demand for highly qualified specialists in the field of management, finance and marketing, creation of organizations of different forms of ownership.

Business education as a type of business activity is characterized by the following properties:

○ Quickly adapt to changes in external conditions is needed.

○ Periods of preparation with a predominance of practical knowledge are short.

○ Educational technologies are more intensive, and there is a variety of used forms of education.

○ Enterprise customers has a great interest in obtaining professional knowledge by staff.

In the conditions of inconstancy and instability of the market, small business organizations (small and medium-sized business entities), which include ANO APE CAS "BUSINESS SEMINARS", has these properties.

The criteria of small and medium-sized business entities are established by the Federal Law of July 24, 2007 No. 209-FL "On the development of small and medium-sized business entities in Russian Federation" [1].

There are various methods to study the market situation. The methods include monitoring, or current observation; statistical analysis; fundamental analysis; technical analysis; rating analysis; expert analysis, etc. Statistical analysis considers average prices, minimum and maximum prices of volumes, average volumes, etc.

The purpose of market forecasting is to study the state of development, and identify possible prospects, taking into account various methods and factors having an objective and subjective nature. The article uses the factor and trend method.

The extrapolation method (trend method) is based on a statistical observation of the dynamics of a certain indicator, determining its development trend and continuing this trend for a future period. In other words, using the extrapolation method, the patterns of the past development of an object are transferred to the future.

The factor method describes the dependence of values and dynamics of indicators on the values and dynamics of economic indicators-factors affecting them.

1. Characteristics of the Market of Paid Educational Services

ANO APE CAS "BUSINESS SEMINARS" provides paid services in the market segment, which can be characterized as all-Russian market of educational paid services in the following way. The market is competitive, with a large number of sellers. According to the degree of saturation with goods, the market is the buyer's one, since the volume of supply significantly exceeds the volume of demand. The market can also be characterized as developing.

The high importance of business education is given by its specific position at the junction of the educational services market and the labor market of specialists from various enterprises and organizations. This fact is especially important for the rise of the regional economy. It is obvious that with regard to educational organizations and institutions, this fact determines the need for their continuous development, the formation of a new effective vertical educational management structure based on close coordination of federal, regional and municipal policies taking into account further increase in their role and independence.

Small business is one of the segments that have a significant impact on the economic development of the country as a whole. Saturation of the market with various goods and services, the formation of a healthy competitive environment, and the creation of new jobs directly depend on the successful development of small and medium business entities.

2. Theoretical and Practical Significance of Small Business Analysis

The themes of market conditions and the competitiveness of small business entities are actual and are discussed, in particular, at scientific conferences. The authorities and governing bodies of all levels, as well as researchers and practitioners, constantly pay attention to these themes.

At the present moment, the current information base for analyzing the activities of small business entities is given by official statistical data of current federal statistical

observations, as well as complete surveys, which are carried out 1 time in 5 years in accordance with the Federal Law of July 24, 2007 No. 209-FL "On development of small and medium enterprises in Russian Federation". Complete surveys were conducted in 2011 (for 2010) and 2016 (for 2015). This explains, as noted above, the inadequacy and fragmentation of official information about small business.

The last complete observation of small and medium-sized business entities showed that the majority of small and medium enterprises (legal entities) in Russian Federation are registered in the field of wholesale and retail trade, repair of motor vehicles, motorcycles, household goods and personal items (40%), operations with real estate, rent and provision of services (21%), manufacturing and construction (10-12%, respectively) [2, 3].

Just over 8.000 small business organizations, i.e. only 0.4% of the total number of small business entities, provides educational services in Russian Federation in 2017. Education is one of the promising areas of activity where small business entities can successfully compete with large organizations, providing paid services to the public [4].

3. Research Methods

Analysis of the market situation is not limited to assessments of the actual situation and the identification of cause-effect relationships in the services market. Analysis of the market situation should be completed with a forecast of the further development of the market. In the conditions of instability of the economic development of the country, lack of reliable information, and for a number of other reasons, the forecasting consumer market situation is currently limited to the short-term or medium-term period, which is quite enough for the purposes of planning the volume of paid services. This forecasting is usually carried out by two main methods: factorial and trend [5].

The factorial method of forecasting the market situation is based on the study of individual factors affecting demand, supply, prices and competition in the market for a particular service, as well as on the determining the possible change of these factors in the forthcoming period.

The trend forecasting method is based on the extension of a previously obtained assessment of the market situation tendency for the forthcoming period. At the same time, random factors affecting this tendency are neglected.

4. Problem Statement

Market situation is an extremely complex economic phenomenon consisting of many heterogeneous and multidirectional intra-market and general economic factors. Therefore, market situation is rather difficult to predict, and only general trend of its development can be foreseen.

Note the following two of the most important factors influenced on the change in *the volume of paid services* of an organization. The first factor is the purchasing power of organizations expressed through the level of *average income* of organizations in Russia, and the second factor is the price level of *paid services.*

Market situation analysis was conducted in relation to ANO APE CAS "BUSINESS SEMINARS" situated in Moscow [6].

We use input data given in Table 1 and the trend method basics in order to derive the

equation for dependence of volume of the organization's paid services on these factors.

Table 1

Input data (given in rubles) for trend analysis

Indicator \ Year	2014	2015	2016	2017
Average income of organizations in Russia	4346793	7502736	11587706	10320527
Average price for paid services	40000	48000	53000	58000
Volume of paid services of ANO APE CAS "BUSINESS SEMINARS"	15175000	9404000	10450000	13474000

5. Construction of the Model

Suppose that the relationship between these factors is linear. Therefore, a trend equation can be obtained.

The classical approach to estimating the parameters of a linear multiple regression model is based on the least squares method (LSM). This method allows to obtain estimates of the parameters a and b such that the sum of squared deviations of the actual values of the effective feature from the theoretical values is minimal.

In order to estimate the parameters of the two-factor model, it is necessary to solve the system of the following form:

$$\begin{cases} a \cdot n + b_1 \cdot \sum x_1 + b_2 \cdot \sum x_2 = \sum y, \\ a \cdot \sum x_1 + b_1 \cdot \sum x_1^2 + b_2 \cdot \sum x_1 \cdot x_2 = \sum y \cdot x_1, \\ a \cdot \sum x_2 + b_1 \cdot \sum x_1 \cdot x_2 + b_2 \cdot \sum x_2^2 = \sum y \cdot x_2, \end{cases} \qquad (1)$$

where a, b_1, b_2 are the parameters of the equation; x_1 is the average income of organizations in Russia; x_2 is the average price for paid services; y is the volume of paid services of ANO APE CAS "BUSINESS SEMINARS".

Table 2 gives the calculated values, which are necessary to solve equation system (1).

Table 2

Calculation of the parameters (given in thousands of rubles) of two-factor model

n	x_1	x_2	$x_1 x_2$	y	x_1^2	x_2^2	$y x_1$	$y x_2$
1	4346.8	40	173872	15175	18894670.2	1600	65962690	607000
2	7502.7	48	360130	9404	56290507.3	2304	70555390.8	451392
3	11587.7	53	614148	10450	134274791	2809	121091465	553850
4	10320.5	58	598589	13474	106512720	3364	139058417	781492
Total	33757.7	199	1746739	48503	315972689	10077	396667962.8	2393734

Let us solve the following system of linear equations.

$$\begin{cases} 4a + 33757.7b_1 + 199b_2 = 48503, \\ 33757.7a + 315972689b_1 + 1746739b_2 = 396667962.8, \\ 199a + 1746739b_1 + 10077b_2 = 2393734; \end{cases}$$

$$\begin{cases} a = 14004.72, \\ b_1 = -0.5, \\ b_2 = 47.04. \end{cases}$$

Therefore, the linear multiple regression equation derived from the data of Table 2 using the least squares method [7] takes the form:

$$y = 14004.72 - 0.5x_1 + 4. \tag{2}$$

In order to forecast the average income of organizations for 2018 (Fig. 1), we use official data from the Federal State Statistics Service for Russia (Table 1) [4].
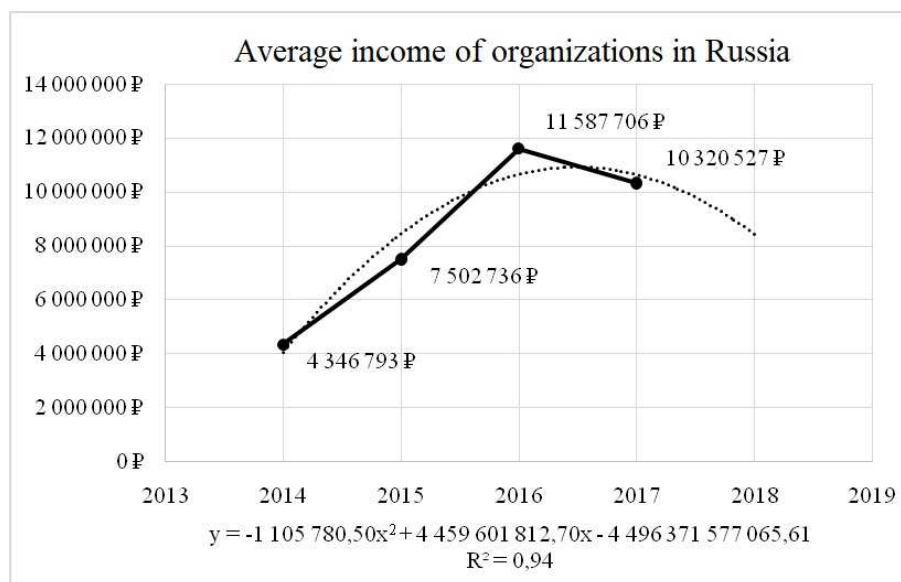

Fig. 1. The forecast of the average income of organizations in Russia in 2018

The dynamics of the average income of organizations in Russia in 2018 will be 81.5% compared to the same indicator of the last year, i.e. 8412081 rubles.

The average price for paid services will remain unchanged, i.e. 58000 rubles.

Based on the previously derived trend equation, we define the forecast volume of paid services of ANO APE CAS "BUSINESS SEMINARS" (Fig. 2).

6. Research Results

Based on the identified tendency in the development of the market of educational services under consideration, we can assume that the educational services market will reduce its dynamics in 2018. These conditions will negatively affect the competitiveness of the ANO APE CAS "BUSINESS SEMINARS", and the volume of paid services will decrease to 12.5 millions of rubles.

The study showed that a decrease in the average income of organizations in Russia by 18.5% is expected in the planned period. Therefore, ANO APE CAS "BUSINESS SEMINARS" operates in the crisis market conditions.

Conclusion

Therefore, during planning and organizing its activities devoted to making the right management decisions to make more profit at lower costs, ANO APE CAS "BUSINESS
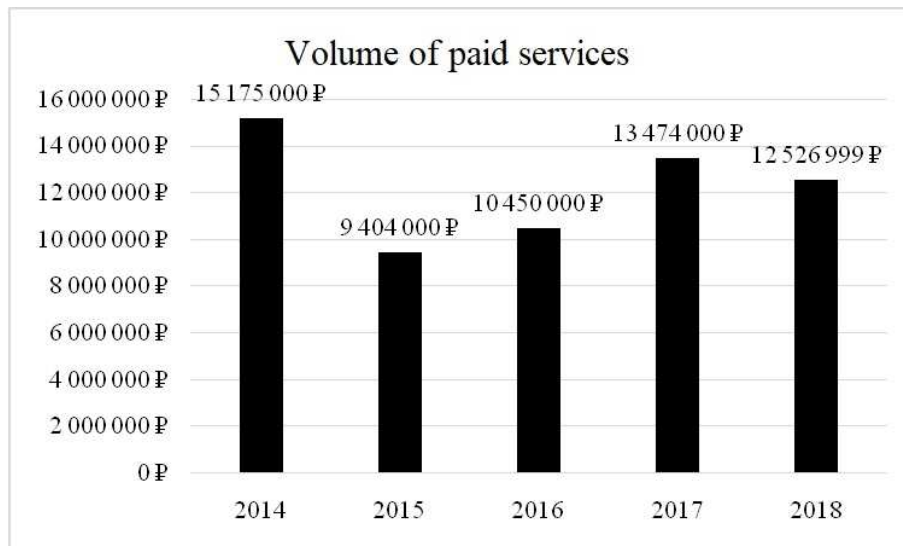
Fig. 2. Forecast of the volume of paid services ANO APE CAS "BUSINESS SEMINARS" in 2018

SEMINARS" should take into account, first of all, the state and changes in market situation.

This is important in the development of measures to improve the planning and management of the volume of paid services, the introduction of new sales technologies, advertising or discounts, etc.

Also, in order to develop plans, it is necessary to conduct a study of competitors. First of all, to collect and analyze the necessary data on competitors, to consider their strengths and weaknesses, market share held, to study material, financial, labor potential, etc.

Particular attention should be paid to studying consumers in terms of their behavior in the market, identifying unmet needs or special positioning, studying niches and market segmentation.

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СТАТИСТИЧЕСКОЕ ИССЛЕДОВАНИЕ КОНЪЮНКТУРЫ РЫНКА ПЛАТНЫХ УСЛУГ В ЦЕЛЯХ СОВЕРШЕНСТВОВАНИЯ ДЕЯТЕЛЬНОСТИ ОРГАНИЗАЦИИ

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В данной статье ставится задача провести статистическое исследование конъюнктуры рынка платных образовательных услуг в Российской Федерации. Особенностью при этом является то, что анализ проведен на примере типичной организации, оказывающей платные образовательные услуги на рынке, – организации из сектора малого бизнеса. Этот факт также является существенным ограничением по причине того, что по организациям малого бизнеса крайне недостаточно официальной статистической информации. Данный вопрос на сегодняшний день является очень актуальным. Конъюнктурный анализ рынка образовательных платных услуг проведен в отношении автономной некоммерческой организации дополнительного профессионального образования «Центр повышения квалификации "БИЗНЕС-СЕМИНАРЫ"» (в дальнейшем, АНО ДПО ЦПК «БИЗНЕС-СЕМИНАРЫ») с применением трендового метода прогнозирования. Целью данного анализа является определение экономической ситуации на рынке платных образовательных услуг, как основы для разработки тактики и стратегии развития бизнеса на будущее.

Ключевые слова: организация; конъюнктурный анализ; рынок образовательных платных услуг; трендовый метод; метод наименьших квадратов.

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