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COMPARISON OF ECONOMIC EFFICIENCY IN PUBLIC AND NON-PUBLIC SOCIAL SERVICE FACILITIES**J. Štrangfeldová, E. Kubišová**

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The aim of the scientific article is to determine which of the selected economic indicators are to be applied when evaluating economic efficiency of social service facilities. The indicators will be tested and ranked by statistical methods using the statistical programme SPSS and the most suitable of them will be used at discriminant analysis to compare the economic efficiency of the facilities as one of their quality criteria. The facilities included in the research comprise both public and non-public social service facilities under the regulating authority of the Self-government of Banská Bystrica region (BBSK).

Key words: social services, social service facilities, economic efficiency, discriminant analysis.

ПОРІВНЯЛЬНИЙ АНАЛІЗ ЕКОНОМІЧНОЇ ЕФЕКТИВНОСТІ ДЕРЖАВНИХ І НЕДЕРЖАВНИХ УСТАНОВ СОЦІАЛЬНОГО ОБСЛУГОВУВАННЯ**Я. Странгфелдова, Л. Кубісова**

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Метою наукової статті є визначення економічних показників, які застосовуються при оцінці економічної ефективності соціального обслуговування. Показники будуть перевірені і, упорядковані за статистичним методами з використанням статистичної програми SPSS та найбільш придатні з них будуть використані для дискримінантного аналізу з метою порівняння економічної ефективності об'єктів в якості одного з критеріїв якості. Об'єкти, включені у дослідження як державних, так і недержавні установи соціального обслуговування в рамках регулюючого органу самоврядування в місті Банська-Бистриця.

Ключові слова: соціальні послуги, соціальне обслуговування, економічна ефективність, дискримінантний аналіз.

PROBLEM STATEMENT. Processes leading to decentralization of public service systems in order to increase their economic efficiency and reduce their burden on public finances [4], while securing the same or better quality of the services provided, have been implemented in post-communist European countries as well as in advanced economies[11]. In the article we focus on the facilities providing social services under the regulating authority of the self-governing regional administration of Banská Bystrica (bbsk) which is also a key provider of social services in the region. In the process of decentralization, towns and municipalities have been appointed with the responsibilities regarding social services provision [3]. These services are services provided in public interest that do not seek profit maximization. However, the newer legislation, act no. 448/2008 coll. On social services enables provision of social services also by non-public providers pursuing profit. In order to increase the efficiency of social services provision, it is necessary to deal with the problems of their financing, demographic changes, increased demand for social services and a shortage of certain types of social services in different regions of Slovakia.

EXPERIMENTAL PART AND RESULTS OBTAINED. The aim of the scientific article is to test the selected economic indicators and determine which of the indicators like total current expenses, payroll expenses, average monthly wage, average monthly payment per 1 client, current expenses per 1 client a month, number of clients and number of employees, are suitable for evaluating the economic efficiency of social service facilities. Consequently, the most appropriate

indicators are used for evaluating the economic efficiency of these facilities by discriminant analysis and the facilities are put in order according to the level of their economic efficiency. Statistical programme Statistical Package for the Social Sciences (SPSS) was used for statistical testing of the indicators. Those with the highest ranking regarding their suitability where then applied in the discriminant analysis for comparison of the economic efficiency of the social service facilities of public and non-public ownership.

The research concerns the social service facilities operated under the authority of the Self-governing region of Banská Bystrica, that is 44 public and 20 non-public providers of social services in the region. The data for the analysis were taken mainly from the Final account of the BBSK for 2006 – 2009, the Report on budget and flow of income and expenditure for the examined period, and data and summaries on number of clients and employees in individual social service facilities.

The study verifies the hypothesis that models testing the discriminating ability of economic indicators by mathematical and statistical programme SPSS can be used also for determining the discriminating ability of economic indicators in the social service facilities and thus for evaluating their economic efficiency.

At multidimensional discriminant analysis, the prosperity of an organization is evaluated by calculating a synthetic value which comprises financial indicators with the best information value, for which they are assigned with the corresponding weight. The discriminant function is expressed as:

$$Z = a_0 + a_1x_1 + a_2x_2 + \dots + a_nx_n. \quad (1)$$

The common objective of all analyses is to find a certain number of suitable indicators x_i that will enable to evaluate the future development. The most suitable indicators are then examined by various statistical methods and assigned weights a_i [2].

The study is focused on canonical discriminant analysis. When using the canonical discriminant analysis, the linear combination of explanatory variables is constructed in order to differentiate the groups. The discriminant function is constructed in such a way so that the individual groups of objects (public and non-public providers of social services) are separated in the best possible way. The discriminant function that results from a linear combination of explanatory variables is called Y and is expressed as

$$Y = b_1X_1 + b_2X_2. \quad (2)$$

Before the discriminant analysis is used, it is necessary to check if the basic requirements have been met. For the discriminant analysis to produce satisfactory results and for its estimation to be consistent, it must meet the normality criteria of individual variables. Covariation matrices of individual groups into which we discriminate should not vary from each other significantly. The process of testing discriminating ability of selected indicators for establishing the economic efficiency through discriminant analysis is as follows:

1) using Shapiro-Wilk or Kolmogorov-Smirnov test of normality for testing normality of input variables. In general, the hypothesis for statistical test is formulated as: H_0 : the data come from normal distribution, H_1 : the distribution of data is not normal. The zero hypothesis is rejected when the p-value in Sig. column in SPSS programme output < 0.05 or 0.01 ;

2) based on Box M test the similarity of covariation matrices is confirmed or rejected. The covariation matrices should be roughly similar in all groups,

3) testing statistical significance of the canonical discriminant function. The function is significant when Sig. value in the Wilk's Lambda output is zero and the value of canonical correlation in the Eigenvalues output $> 0,700$;

4) determining the discriminating ability of the selected indicators from absolute values of standardized coefficients of the canonical discriminant function. The indicators with the highest value have the biggest discriminating ability;

5) determining the indicators with the biggest discriminating ability based on correlation coefficients between the discriminant function and the individual explanatory variables;

6) subsequent assessing of the fact if the model has a sufficient discriminating ability. The model has a good discriminating ability if it reaches the value of over 60% in the last step;

7) evaluating the economic efficiency of social service facilities in the BBSK using the discriminant analysis. The principal advantage of using the discriminant analysis for the evaluation is that it

eliminates mutual dependancies between individual partial functions through adjustment of weights at the evaluation.

The most effective facility is the one with the maximum value of the Ivancic's deviation. The discriminant analysis can make the decision-making process in practice significantly more objective. However, due to the complexity of the calculations, the practical usage of the method is limited by the availability of the respective statistical software.

Economic indicators with discriminating ability in the social service facilities of self-governing region of banska bystrica. The self-governing region of Banska Bystrica is the second largest self-governing region in the Slovak Republic. It comprises 13 administrative districts, 492 municipalities and 24 towns. It is a region characterized by lower population density compared to other Slovak regions. At the same time, it has higher than average share of population of post productive age. The growing number of senior citizens requires respective public policies and planning, namely in the area of healthcare and social services. The BBSK belongs to the biggest providers of social services in Slovakia and is also the biggest social services operator on its territory in relation to the population of the region. In all districts of the region (except Banska Bystrica district) there is increased demand for permanent stay services, which is the result of absence of field social services (e.g. day care service) and supporting services (e.g. canteens for pensioners) that are the responsibility of towns and municipalities. The overall capacity of social service facilities in the region has been increasing every year since 2006.

As of 31. 12. 2009, the BBSK region had founded 44 social service facilities that comprise homes for pensioners and social service homes where services are provided mainly to the clients of senior age with physical or mental disabilities, to children and adults with mental disabilities and associated disorders. It also operates the facility of day care service, crisis centre, shelters, the station of day-care service, home for single parents and foster parent care facilities.

As of 31. 12. 2009, the BBSK region had registered 87 non-public providers and certified entities performing activities within the scope of the Act on Social Services and Act on Social and Legal Child Protection and Social Supervision. Most of the non-public social services providers are non-profit organisations or civic associations and they provide also services that are not offered by the public facilities founded by the BBSK. They focus primarily on low capacity facilities of family type with effective combination of several types of activities.

The basic selection of objects and their characteristics in our case was represented by 44 public and 20 non-public providers of social services under the regulating authority of the BBSK self-government. The evaluation was carried out using the data from all selected facilities from years 2006–2009. The matrix with these data was processed by the discriminant analysis method.

The first step at testing the discriminating ability of the selected indicators was testing the normality of the

input variables by Shapiro-Wilk or Kolmogorov-Smirnov normality test.

In the second and third evaluation steps, the statistical significance of canonical discriminant function was established. Table 1 shows the suitability of using the discriminant analysis at evaluation the economic efficiency in the social service facilities using the selected criteria and indicators. This is based on the fact that all monitored indicators are statistically significant in all four years, as there were zero values in the test of statistical significance Wilk's Lambda and high values of canonical discriminant function exceeding the required limit of 0,700.

Using the outcomes of the evaluation through the discriminant analysis in the SPSS programme, the results for all four years in question are summarized and the significance of evaluated criteria is established.

Results of the fourth step of the analysis are shown in the table where the discriminating ability of the indicators is expressed by standardised coefficients of the canonical discriminant function. The SPSS program assigned every indicator a value that expresses its level of discriminating ability. The indicators with the highest value have the biggest discriminating ability.

Table 1 – The highest standardised coefficients of canonical discriminant function

Year	Indicators with the highest discriminating ability		Year	Indicators with the highest discriminating ability	
2006	Wages expenses	1,89	2008	Wages expenses	5,37
	Number of employees	1,19		Number of employees	3,76
	Average monthly payment per 1 client	0,85		Total current expenses	2,34
2007	Wages expenses	3,99	2009	Total current expenses	1,27
	Number of employees	2,65		Number of employees	1,26
	Average monthly payment per 1 client	1,18		Average monthly salary	0,79

Source: Own by [5–9].

As we can see, the same variables had the biggest discriminating ability in years 2007 and 2006, and they were also ranked in the same order, although they reached higher discriminating values in the second year. In 2008, the first two indicators were the same as in previous years but the third biggest discriminator was the total current expenses this time. In 2009, the position of all indicators based on their discriminating ability changed. Total current expenses had the biggest discriminating ability, followed by the number of employees and the average monthly pay. Their values are shown in the Table 1.

In the fifth step of the analysis, discriminating ability was tested between discriminant function and individual explanatory variables in the two types of facilities in

question (public and non-public providers of social services) by SPSS programme that performed the analysis based on correlation coefficients. It evaluated individual indicators and put them in order from the one with the highest value to the lowest one, which again means that the variables with the highest value have the biggest discriminating ability. As in the previous table, Table 2 contains only three indicators with the highest values.

Table 2 – Highest correlation coefficients between discriminant function and individual variables

Year	Indicators with the highest discriminating ability		Year	Indicators with the highest discriminating ability	
2006	Average monthly payment per 1 client	0,536	2008	Average monthly salary	0,555
	Wages expenses	0,394		Total current expenses	0,443
	Total current expenses	0,385		Wages expenses	0,405
2007	Average monthly salary	0,403	2009	Average monthly salary	0,736
	Total current expenses	0,347		Total current expenses	0,423
	Wages expenses	0,326		Wages expenses	0,415

Source: Own [5–9].

In the first of the examined years, 2006, the indicators with the biggest discriminating ability included average monthly payment per 1 client, wages expenses and total current expenses. In the following three examined years, same indicators were evaluated as having the biggest discriminating ability every year, and they were average monthly salary, total current expenses and wages expenses. The values of correlation coefficients in each of the examined years prove the fact that the biggest differences between public and non-public providers of social services are reported by the three indicators with the biggest discriminating ability.

Average monthly payment per 1 client is, according to statistical data based on which the analysis and evaluation of the economic efficiency were performed for every examined year, higher at non-public providers of social services. Conversely, the indicators of total current expenses, wages expenses, or average monthly salary are higher at public providers in the given period. This can be explained by higher total operational costs of these facilities, as they have larger capacity, and higher number of clients and employees.

The model achieved a very good discriminating ability as it reached the value of over 95%, or 94%, in the first three examined years. Although the total discriminating ability dropped to 64,6% in 2009, it was still over 60%, where the discriminating ability of the model is considered to be very good. Evaluation of the outputs confirms the suitability of using the

discriminant analysis for evaluation of economic efficiency, as the discriminating ability in every examined year is over 60%.

Based on the discriminating ability of the tested economic indicators, wages expenses, average monthly payment per 1 client and total current expenses were used in the final discriminant analysis for years 2006 – 2009.

Comparison of economic efficiency of public and non-public providers of social services. The last step in the economic efficiency evaluation of social service facilities in the BBSK is a complex discriminant analysis performed in line with the step 7 of the Methodology. It uses economic indicators that showed the best discriminating ability by the SPSS program and therefore are the most suitable for complex evaluation of the economic efficiency.

The discriminant analysis shows that in the BBSK, non-public social service facilities are more economically efficient than public ones. There is only one public facility among the first ten and all non-public facilities are in the first half of the list.

CONCLUSIONS. The discriminant analysis used in the process of evaluation of economic efficiency has wide scope of application. The hypothesis was verified and it was proved that the discriminant analysis can be used for evaluating the economic indicators at social service facilities. Its contribution lies in the fact that in the course of evaluation, several different criteria can be used for comparison of efficiency of individual indicators. This can provide an overview of the efficiency in the provision of the services in question. Results of the analysis can be used for optimization of the system, its restructuring, obtaining the information about the current average efficiency of the providers' system or monitoring the effect of changes in specific parameter(s) on the efficiency level. However, when implementing the evaluation processes it is necessary to eliminate problems, especially those related to inadequate selection of evaluation criteria, or incorrect interpretation of evaluation outputs.

Social services should meet the required quality standards, i.e. be accessible to clients as for their location, opening hours and price. From the efficiency point of view it means that they should meet the clients' needs and at the same time secure the optimal combination of price, quality and current demand. On the whole, the social services should be interconnected so that they form a complex network in a given territory. The system needs

to be innovative, variable and flexible so that it can reflect and respond to changing needs. In view of the demographic, economic and social developments in the following years it is necessary to allocate sufficient financial, material and personal resources for building a network of high quality social services across the country.

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СРАВНИТЕЛЬНЫЙ АНАЛИЗ ЭКОНОМИЧЕСКОЙ ЭФФЕКТИВНОСТИ ГОСУДАРСТВЕННЫХ И НЕГОСУДАРСТВЕННЫХ ОРГАНИЗАЦИЙ СОЦИАЛЬНОГО ОБСЛУЖИВАНИЯ

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Автор определяет экономические показатели, которые применяются при оценке экономической эффективности социального обслуживания. Показатели будут проверены и упорядочены статистическими методами с использованием статистической программы SPSS; наиболее пригодные из них будут использованы для дискриминантного анализа для сравнения экономической эффективности объектов как один из критериев качества. Объекты исследований включают в себя как государственные, так и негосударственные организации социального обслуживания в рамках регулирующего органа самоуправления в Банской Быстрице.

Ключевые слова: социальные услуги, социальное обслуживание, экономическая эффективность, дискриминантный анализ.

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