THE EFFECTIVENESS OF PUBLIC FINANCES PROVIDED TO PUBLIC LIBRARY SERVICES IN THE CZECH REPUBLIC

Simona Pichová*

University of Pardubice, Studentska 84, Pardubice 53009, Czech Republic

Abstract

Purpose of the article This article aims to provide an overview of the efficiency of allocated funding for the provision of public library services. The article deals with monitoring the impact of individual variables on the dependent variable - the amount of return on in-vestment (ROI).
Methodology/methods The article works with the values obtained in the project "We will calculate ROI," which took place in 2015 in the Czech Republic in cooperation with the Municipal Library in Prague and Pardubice University with the support of the Ministry of Culture of the Czech Republic. Data obtained in this project was drawn up by the cost-benefit analysis. The impact of individual determinants of the amount of ROI will be assessed by multiple regression analysis and cluster analysis.
Scientific aim The article aims to determine, depending on the amount of selected indicators ROI. Estimates show a significant determinant which ones are important and have an impact on the value of ROI. The influence of regional indicators and values regarding specific libraries.
Findings The article accounted the ROI of 36 libraries in the Czech Republic and their comparison for the years 2012 and 2014. Libraries were divided into groups based on similarity of values of significant indicators.
Conclusions This is the first research in the Czech Republic, which was made in measuring the value of public libraries, which were determined to ROI on specific libraries for such a large sample of observations. Monitoring the impact of regional indicators points to the fact that the amount of the ROI does not affect the location of the library, the library or success does not depend on the county in which the library is located. Libraries can be divided into groups that differ significantly and according to this distribution can select different methods of public funding.

Keywords: public library, public services, efficiency, public investments, cost-benefit analysis.

JEL Classification: H41, H21, D61

* Corresponding author. Tel.: +420-466-036-478.
E-mail address: simona.pichova@upce.cz.

Introduction

The current situation in public finances calls for austerity measures and conscientious handling of public funds. As part of this trend is to reduce the cost of some public services. Public library services among them also ranks but just reducing expenditures on these services is debatable topic.

Public libraries serve for whole society and they have impact on personal development and knowledge potential of the population throughout the country. The consequence of the development of science and technology, mobile applications and the Internet are often related to searching for information on replacing these modern methods instead of borrowing books and visiting libraries. It is because of these facts, libraries are forced to provide other, additional or cultural services to visitors. Due to these phenomena leads to reflection on the efficiency of the services provided by public libraries, over their economy and efficiency, the amount of invested funds from public budgets.

1 Valuation of public services

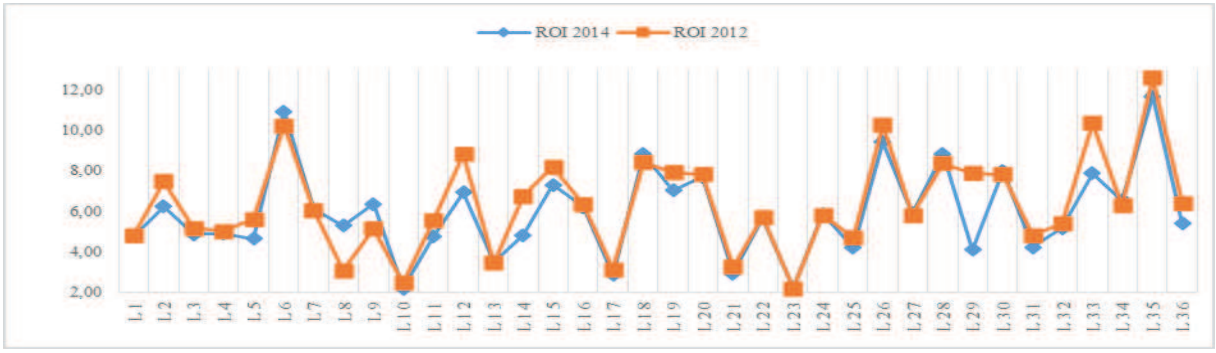
Many international studies show that there are appropriate procedures that can define the output of public service and appreciate its usefulness for its users. Economic valuations of public libraries begun carried out more frequently in recent times. In the middle of 1990s, researchers (Aabø, 2009; Holt et al., 1999) began to study the benefits of public libraries,measure their value, and ask users for their opinions regarding their performance. In 1990´s came a new methodology, taking a broader view of the value of libraries and seeking to establish their value to stakeholders and clients. It was used the Balanced scorecard methodology, which enabled to set goals to split hard numbers under consideration to determine which services should be changed, and also to consider process improvements (Kaplan & Norton, 1996, Walsh & Greenshields 1998). The high point of these approaches for evaluation of public library services can be seen in the current studies of value using return-on-investment and contingent valuation. These methods are generally conducted to determine the economic benefit to citizens of public libraries and the economic benefit of particular services, such as national union catalogues and bibliographic services (Missingham, 2005).

Several methods can be used to measure library value. Methods of economic evaluation of non-market goods or effects, based on consumer's surplus, are mainly three: the Travel Cost Method, the Hedonic Price Method and the Contingent Valuation Method (Marella & Raga, 2014). The problem with these methods is again difficult measurability of outputs or results (Modell & Wiesel, 2008) and the need for direct interaction with the consumer. Other methods replicate practices commonly used in the private sector, as an example is the return-on-investment (Kaufman & Watstein, 2008). The goal is to provide a clearer picture of the benefits and costs of service producer. These methods can be used both to analyse the efficiency of individual providers and for the region or the entire system of the selected type of service in the state (McIntosh, 2013).

Many economic studies of the ROI of public libraries use contingent valuation (CV), which was established in 1947 (Cumming & Taylor, 1999), to provide an estimate of the value of their services when users receive those services for free. CV surveys ask users what they would be willing to spend in time and money to get access elsewhere to the information resources they recently received from the library. This method allows researchers to calculate the average user-assessed value of access. The contingent valuation method is a widely used nonmarket valuation method especially in the areas of environmental cost (Venkatachalam, 2004), health care (Klose, 1999), public libraries (Stejskal & Hájek, 2015). CV principle is the basis of a method that is still used today in practice – contingent valuation method (CVM). The CVM is a survey-based technique generally accepted as a meaningful tool used to estimate the value of various nonmarket goods (Lee & Chung, 2012), it reflects altruistic motivation, a major component of non-use value in contingent valuation. This method gained popularity after the two major non-use values, namely, option and existence values have been recognised as important components of the total economic values (Venkatachalam, 2004). For methodology of contingent valuation see (Russell et al., 1995; Wedgwood & Sansom, 2003). Results from contingent valuation studies are used for many purposes in benefit–cost studies (Carson, 2012; Marella & Raga, 2014).

2 Data obtaining

The cost-benefit analysis was chosen to calculate the values for individual libraries in the Czech Republic. The research was conducted in 2015 in cooperation with the Municipal Library in Prague and University of Pardubice with the support from the Ministry of Culture in the Czech Republic. It was attended by 40 libraries, 36 libraries of which were returned and processed the data that was needed to determine the outcome of return on investment. Individual libraries are represented by all regions of the Czech Republic, except of the Ustecky Region. Data of libraries was monitored between the years 2012 - 2014. Comparison of values was conducted between the extreme years (see Fig. 1).



Legend: L1 – L35 means libraries which are more descripe in table 2 and table 3, L36 is city library from NUTS CZ05.

Source: Own research

Figure 1: Comparison of the return on investment of libraries in the years 2012 and 2014

The libraries that participated in the research are shown on the X axis. They are named according to the cities in which tehy are located. The values of ROI are situated on the Y-axis.I, they moved in 2012 in the range of 2.18 to 12.62, and in 2014 in the interval from 2.19 to 11.69. It is obvious (see Fig. 1) that values of ROI in 2014 reported in many libraries lower values, within two years are reported to reduce the interval ROI nearly unit (0.93). Figure 1 indicates the decreasing trend of ROI values.

3 Analysis

The next part of the article will be working with the latest data. Regression analysis will be performed to determine the impact of various determinants on the level of ROI by using data for the year 2014. Cluster analysis will be used in the article to shown what groups can divide the library according to selected determinants. Analyses are working with data from 35 libraries of the Czech Republic, the city library L36 was excluded from the analyses because of lack of data. All statistical analysis used in the article were conducted in software Statistica10.

In analysis were used selected determinants shown in Table 1 with their main charakteristics and their minimum and maximum value, which were found in the surveyed libraries.

Table 1 Selected determinants and their main characteristics value

Determinant	Main characteristics	MIN / MAX value	Units
Number of inhabitants in region	population in the selected region	299293 / 1315299	person
Unemployment rate in region	the proportion of the unemployed to all persons able to work	5,7 / 9,8	percent
Average gross wage in region	the share of wages per employee	21910 / 25570	CZK
Number of library fund	the amount of different kind of books which has library for their users	17250 / 2158723	pieces
Number of events in library	various cultural events such as author readings, book signings, events for children and youth, themed events	36 / 4060	pieces

Source: Own research

3.1 Correlation analysis

For the needs of implementation of both types of analyzes was the first step necessary to make a correlation analysis. Spearman's test showed that individual determinants have not between them relationship. Data are not correlated and selected determinants may be used in the analyzes.

3.2 Multivariable linear regression model

For analysis of the relationship between variables were used the multivariable linear regression model. This model was designed to examine the relationship between value of the return of investment (dependent variable

Yi) and selected determinants (all are independent variables, see in table 2), which can by represented by an equation of the form:

$$Yi= \beta0 + \beta1xi1 + \beta2xi2 + \ldots + \beta kxik + \varepsilon i \quad (1)$$

where i = 1, 2, … , n,Yi is the *i* measurement of the dependent variable, β is regression coefficient known as the intercept and the slope respectively, x_i is the *i* measurement of the independent variable and ε_i is its associated error term (random failure).

Table 2 Parameter estimates of regression model for selected determinants

Determinant	Parametr p estimate
Number of inhabitants in region	0,945850
Unemployment rate in region	0,728630
Average gross wage in region	0,995389
Number of library fund	**0,009801****
Number of events in library	**0,040910***

Legend: ** significant at p < 0,01, * significant at p < 0,05.

Source: Own research

The correlation coefficient generated model reached the value of 0,5556 and a coefficient of determination was 0,3087. Important value is also a p-value, which reached values 0,046.

Table 2 shows that regional determinants are insignificant and determinants in relation with library are significant values. It means that value of ROI is highly dependent on: (1) number of library fund; (2) number of events made by libraries. For this reason, these indicators were selected for further analysis in order to form groups of libraries - cluster analysis.

3.3 Cluster analysis

For further processing of data was chosen cluster analysis, which encompasses a number of different algorithms and methods for grouping objects of similar kind into respective categories. The aim of cluster analyses is to organize observed data into meaningful structures, to develop taxonomies according to different value of indicators

For measurement of the distance was chosen Euclidean distance, which is the most commonly chosen type of distance. It is the geometric distance in the multidimensional space which has form:

$$\text{distance}(x, y) = \{\sum_i (x_i - y_i)^2\}^{\frac{1}{2}}. \quad (2)$$

The number of 35 libraries was monitored by the analysis (see in table 3) which have been aggregated into groups by the impact of significant indicators of previously conducted multivariable linear regression analysis, therefore, affect the value of return on investment, number of library events and number library fund.

Table 3 Groups of libraries and their description used in analysis

I. group			II. group		
Code	Library type	NUTS 2 code	Code	Library type	NUTS 2 code
L1	CL	CZ02	L10	SL	CZ05
L2	CL	CZ05	L16	SL	CZ05
L3	CL	CZ05	L17	SL	CZ07
L4	CL	CZ03	L21	SL	CZ08
L5	CL	CZ03	L23	SL	CZ03
L6	CL	CZ08			
L7	CL	CZ08			

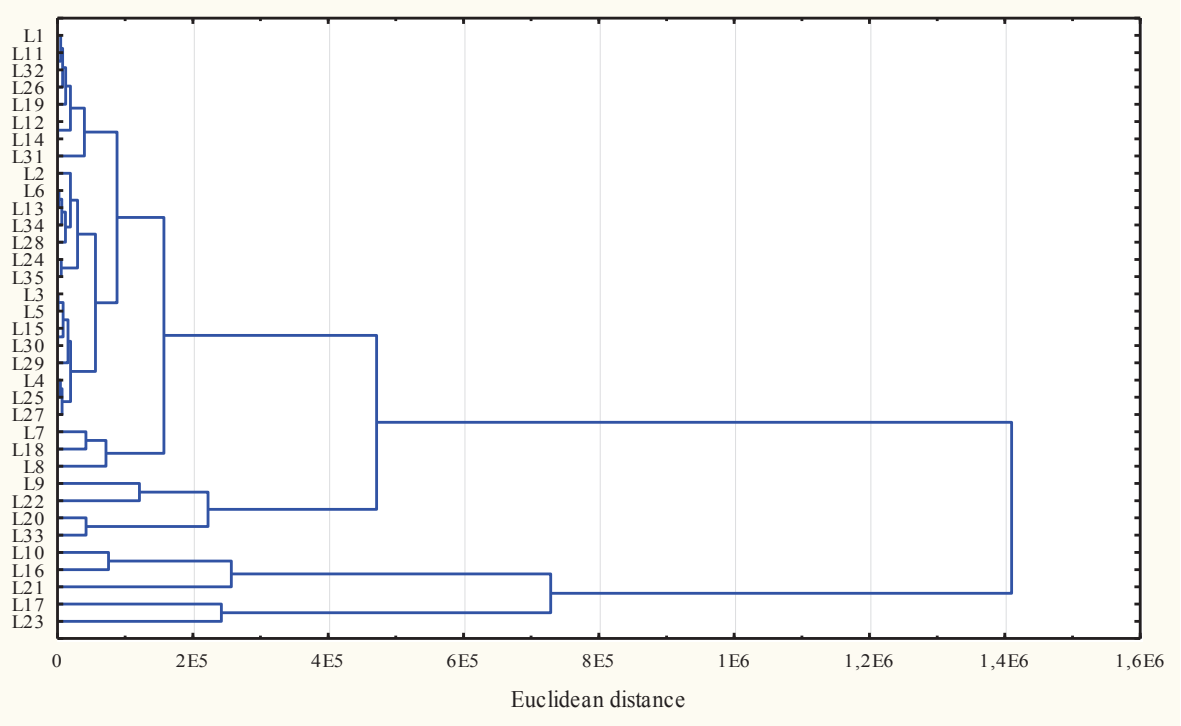
L8	RL	CZ06
L9	CL	CZ05
L11	CL	CZ08
L12	CL	CZ04
L13	CL	CZ04
L14	CL	CZ05
L15	CL	CZ08
L18	CL	CZ08
L19	CL	CZ08
L20	CL	CZ08
L22	RL	CZ05
L24	CL	CZ07
L25	CL	CZ02
L26	CL	CZ02
L27	CL	CZ03
L28	CL	CZ03
L29	CL	CZ08
L30	CL	CZ07
L31	CL	CZ03
L32	CL	CZ02
L33	CL	CZ06
L34	CL	CZ03
L35	CL	CZ05

Legend: Library type: CL = city library, RL = regional library, SL = scientific library.

Source: Own research

The results of cluster analysis are shown in Fig. 2. Libraries are shown on the Y axis (L1 - L35), the distance clustering on the X axis. Hierarchical data indicates the formation of two groups of libraries. The first group consists of all city and county libraries. The second group is represented only by scientific libraries.

Cluster analysis divided the libraries into the two groups that are distinctly different. City and county libraries in group 1 have a considerably lower number of books, employ fewer than a third of workers than research libraries (group 2).



Source: Own research

Figure 2: Distribution of libraries into groups based on selected indicators

Table 4 describes the differences between groups of libraries. Despite the lower number of registered users, libraries in group 1 have their operations more effective results. One invested Czech crown will bring the value of 6.00 Czech crown for society. The second group represented by scientific libraries organize less events for society and for users. The number of books per capita in the city and county libraries belongs 4.58 books, unlike the first group, where the number of library books is almost eight books for each person in the city (7.81). The value of ROI in scientific libraries value is 2.86, which is half less than the first group.

Table 4 Descriptive characteristics of examined library groups

Indicators	I. group	II. group
Number of library collection	128 052	1 432 124
Number of library events	380,50	264,00
Number of library employs	21,98	79,20
Number of book loans per capita in the city	7,81	4,58
Number of registered users	4 251	13 794
Value of return-on-investment	6,00	2,86

Source: Own research

4 Discussion

From the results of return on investment analyses in 2012 and 2014, we can see that there are changes in these values in individual years, while there is a recession. At the same time there is a tendency to reduce the finances that are provided from public sources. For these purposes it is necessary to find a method of evaluation of public libraries and prove whether their activities are effective or not. Cost benefit analysis method allows monitoring and examine in detail of each library management and reflect on their own profitability.

From the regression analysis clearly shows that the impact of regional indicators does not affect the amount of ROI and it means that the effectiveness of the libraries not depend on its location. The greatest effect was observed in a variable amount of library collections and the number of events organized by the library. These

variables were also used for cluster analysis, which divides the 35 libraries into two groups. The first group will cover all city and regional libraries with a total of 30 libraries. In the second group is situated only research libraries in the number of five institutions. This division means in practice to apply different approaches to their financing and management, to look at them in terms of their specific needs and operations.

Conclusion

Findings of the article are: (1) comparing the ROI values between 2012 and 2014; (2) regression model and finding the positive impact of library collections and the number of events held at the library on the amount of ROI; (3) cluster analysis was created and the result divided libraries into the groups.

The article shows the fact that it is possible to determine the value of the effectiveness of individual libraries in the Czech Republic and perform a comparison between them. The influence of individual variables, whether local values or values regarding specific library management institutions. Based on the similarity of data libraries they were divided into groups and these data can be used to create a taxonomy of approaches to their financing in order to increase efficiency.

This is the first research on the territory of the Czech Republic, who valued the ROI of 36 libraries in the Czech Republic and provides a unique microeconomic analysis of data relating to the field of publicly provided services. Evaluation of selected indicators showed that the regional indicators do not affect the amount of ROI of and therefore on the economy of libraries.

Recommendations for further analysis is create detailed examination of the determinants and their impact on the value of ROI, also to define the precise characteristics of each group of libraries to enable a specific approach in the management of libraries and enhance their effectiveness.

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