

48

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**The Impact of Occupancy in Collective Accommodation
Establishments on the Selected Macroeconomic
Variables in the Czech Republic in the Period
2001 - 2015**

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Abstract

Patrik Kajzar, Klára Václavínková: The impact of occupancy in collective accommodation establishments on the selected macroeconomic variables in the Czech Republic in the period 2001 - 2015.

The aim of this paper is to assess the impact of occupancy in collective accommodation establishments in the Czech Republic at an average rate of unemployment (%) to GDP (%) and the average pace of real wage growth (%) between 2001-2015. The methods are regression and correlation analysis. The output is then evaluate the impact of occupancy on the selected parameters. The most significant impact has occupancy in collective accommodation establishments at the average rate of unemployment. When we are comparing the GDP growth parameters and occupancy collective accommodation establishments is no evidence of a linear relationship. For evaluation of development depending average growth rate of real wages in total attendance collective accommodation establishments is indirect evidence of a weak linear dependence.

Keywords: collective accommodation establishments, correlation analysis, Czech Republic, macroeconomic variables, occupancy, regression.

JEL classification: C02, L83

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Introduction

Tourism is one of the fundamental factors for strengthening the economy in the Czech Republic. Tourism can be seen in the arrival or departure of visitors. The authors focus on some of the indicators that have an impact on the visitor accommodations. The following text is dedicated to guests in collective accommodation establishments in the years 2001 to 2015. The authors focused on specific variables and an average unemployment rate (%) to GDP (%) and the average pace of real wage growth (%) between 2001- 2015. The aim of this paper is to assess the impact of occupancy in collective accommodation establishments in the Czech Republic at an average rate of unemployment (%) to GDP (%) and the average pace of real wage growth (%) between 2001-2015. The authors use data visitor collective accommodation establishments. These data include data from the Czech Statistical Office. The Authors are finding connections between different parties.

The authors divide the article into 4 chapters. The first chapter is devoted to theoretical bases examined issues. The second chapter is devoted to the development of occupancy in collective accommodation establishments in the Czech Republic between 2001– 2015, it is including current data for the first half of 2016. In the third chapter, the authors pay attention to the mathematical definition of regression and correlation analysis, which is used to describe the statistical dependencies. The fourth and last chapter the author has devoted itself analysis of selected economic indicators, including its evaluation.

1. Theoretical resources examined issues

According to Morrison (1995) it may be the typical characteristics of tourism marketing divided into generally applicable and relevant specifics.

Tourism services can be divided into several categories. They are representing the main services essential activities such as transport, catering, services side, which includes guide, interpreter, program creation for leisure. Another group are complementary services such as informatics, promotion and advertising, and the last service infrastructure including transportation network, business network or a system of health care (Václavíková, 2012).

Morrison (1995) has defined six general specifics that affect marketing services and cannot be changed or deleted:

- Services are intangible nature.
- Production services are often inseparable from their place of consumption. For most services are characterized by the production and consumption are simultaneous.
- Services cannot be stored. If they are not sold at the time they are offered, they cannot sell them later, simply no longer exist.
- When providing services to absence of a distribution system. Customers must, with few exceptions, for the service out for yourself.
- Costs are subject to variability and the intangible services provided. It cannot accurately determine the variable and fixed costs, as well as the planned production volume of services.

- Some services cannot be separated from individuals who provide it. An example they might be hotels, restaurants and spa facilities.

It should be noted that services are not homogenous and the creation of menus is not always follow the same factors. The wide range of new services to market characteristics play a major role as the degree of tangibility, the extent of direct contact with the customer, technology and equipment used in the production of services (Jakubíková, 2012).

Depending on the type of organization, approaches to business management and operation of the external environment, they affect the marketing of services other related specifics that they can be eliminated by changes in governance or legislation. In many tourism businesses have marketing activities very narrow character. Marketing functions in them is often limited to supporting the implementation of services (eg. advertising, sales promotion, etc.). Other marketing activities (such as pricing policies, development of new service concepts, research and others) conducted another department or company management, which makes it impossible for such undertakings introducing the concept of socially oriented marketing (Jasinskas et al., 2016).

It is also seen considerable influence government regulation and deregulation in the field of tourism. Moreover, in this field it plays a key role in supporting government agencies and non-profit organizations that promote the site and often have different objectives than business entities. Tourism and multiplication effect in the region's Contribution deals with the issue of tourism, its position and Economic Consequences. Also it focused multiplication effect on tourism (Pellešová, 2015).

Service is any activity or benefit that one party can offer the other hand, is essentially intangible and does not result in its possession. Production services may or may not be associated with a tangible product (Botlíková, Kostková and Václavíková, 2012).

According Kiráľová (2003) it is in the provision of services is important to consider other factors that sale and purchase services operate. Above all, the service cannot directly evaluate the physical senses, it is only exceptionally can try. Therefore, when purchasing services, customers often use emotional and irrational decision affected eg. a fashion, prestige, celebrities, corporate image, uniqueness, etc. services.

Great importance is placed on word-of-mouth advertising. Most services cannot be a pretest, because customers rely on when choosing other people's experiences. And it is also related to an increased need for support materials (Kostková. Lukoszová and Wilczková, 2009).

Certification of accommodation services.

Fragmented and inconsistent certification of private entities providing accommodation services in tourism by the end of 2003, they are included in the list of 55 obstacles for the development of tourism in the Czech Republic because the two largest professional associations of hotels, guest houses and similar establishments (NFHR and HO.RE.KA Czech Republic) make new rules of evaluation accommodation facilities, provide precise criteria for the classification of certain categories and introduce a uniform classification of accommodation facilities in the Czech Republic. Certification has been recognized by the Czech Tourist Authority (CzechTourism Agency) and the Ministry of Regional Development and entered into force in January 2004. It is a division of accommodation establishments into groups according to the extent and quality of services. Hotels division are divided into categories from 1 to 5 stars internationally recognized concept. Uniform System for the classification of accommodation facilities in these categories compare the state of equipment of each hotel and its service level requirements for each category. The basic philosophy of

treating uniform classification of accommodation facilities is voluntary principle. The classification board grant every entrepreneur who applies for it and meets the criteria (for a fee CZK 1,500 for members of professional associations and CZK 3,000 for others, completing the questionnaire, the Commission will decide whether the certificate and the number of star), one classification symbols including certificates in accordance with appropriate classification in each category. The certificate is awarded since 2006 for a period of 4 years.

The main goal of certification in addition to service quality levels are increased transparency, awareness and better understanding of consumers, visitors, or CK, and CA. The official classification: * TOURIST, ** STANDARD, *** KOMFORT- **** FIRST CLASS a ***** LUXUS.

Selected economic indicators in the hotel industry

The hotel business is generally consuming by large amounts of capital. Coefficient between investment and turnover is in the ratio 1: 3, and therefore is directly pushed to achieve higher productivity (De Cantis and Ferrante, 2011).

The average profitability of accommodation facilities is determined from the utilization of capacity. Optimum capacity utilization is reported to be approximately 70%. Internationally recognized limit is about 60%. In the area of market analysis was recently around the world begin as part of the information on the percentage of occupancy to assess the cost and revenue per available room. Among the indices tracking the productivity of labor belongs to such indicator tracking the average headcount per room. In high quality hotels, the average number of employees per guest room 0.98. The European average is around 0.9. Attendance is an important indicator of evaluation of tourism services. If we look at collective accommodation establishments, we can say since 2001 in this area is growing character (Botlíková and Botlík, 2012).

2. Occupancy in collective accommodation establishments in the Czech Republic between 2001 – 2015

Occupancy in the years 2001-2015 was fluctuating character. The following chart assesses the evolution of guests at collective accommodation establishments in the parameters: total number of guests, number of residents and number of residents. We can say that the number of guests is increasing since 2002. The exceptions are the years 2008 to 2011. The reason is the ongoing global economic crisis. In 2015, it was so far the largest number of guest. For other parameters, it is a similar trend.

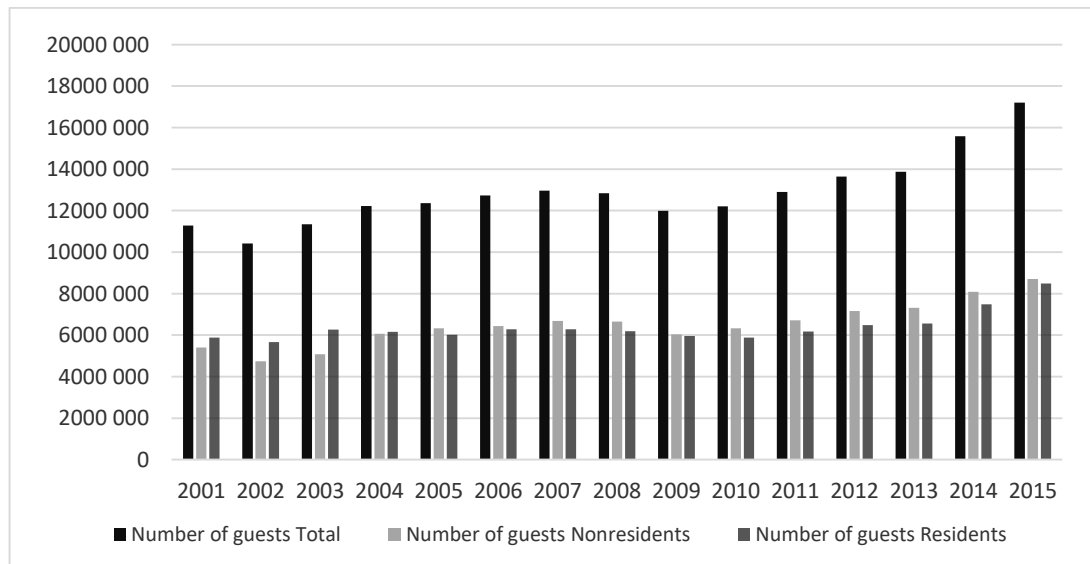


Fig. 1: Occupancy in collective accommodation establishments in the Czech Republic between 2001 – 2015

(Source: Own calculations based web portal Czech Statistical Office: Cestovní ruch – časové řady. [online][vid. 29. září 2016]. Dostupné z: https://www.czso.cz/csu/czso/cru_cr)

Occupancy in collective accommodation establishments in the first half of 2016. At the time the article was created, the data from the first half of 2016 were published. For the sake of completeness, the authors present this dataset.

In 2nd quarter of 2016 the total number of guests in collective accommodation establishments in the county rose from the first quarter by almost 40%, more than 48,000 people. An annual increase reached 1.6%, which is the fourth lowest growth among the regions. The collective accommodation establishments Region in the 2nd quarter in 2016 it was accommodated 174.8 thousand guests, ie 3.8% of the total number of guests in the country. Domestic guests accounted for the overwhelming majority, the foreign visitors accounted for about 16% of the total. The number of overnight stays amounted to 514.6 thousand and against the same period of 2015 increased by 2.8%. In the period from the beginning of the year to the end of June 2016 region of Zlín visited and stayed overnight at least one night in collective accommodation establishments total of 301,000 guests. Compared to the same period last year increased the number of visitors to the region by 3.8%. Number of guests - resident (foreign) increased by 15.5%, domestic guests (residents) increased by 1.7%. Growth was recorded in overnight stays in both groups of visitors at home by 4.3% and non-residents by 8.2%. The total number of overnight stays by non-residents increased compared to the 1st half of 2015 by 8.2%.

3. Material and Methods

The aim of this paper is to assess the impact of occupancy in collective accommodation establishments in the Czech Republic at an average rate of unemployment (%) to GDP (%) and the average pace of real wage growth (%) between 2001-2015.

In the following paper the author pay attention to the mathematical definition of regression and correlation analysis, which is used to describe the statistical dependencies.

Hindls, Hronová, Seger and Fischer (2007), McClave and Sincich (2011), Ramík and Stoklasová (2013), Tošenovský (2014) say that regression analysis is concerned with unilateral

dependencies, this means that examines general trends in changes in response variables (the dependent variable y) due to changes in explanatory variables (independent variable x). Correlation analysis focuses on the interdependencies.

To determine the tightness of dependence (relative strength) of two variables will be used for correlation analysis. Determining extent of dependence or correlation we use the correlation coefficient. The coefficient values between -1 and +1, -1 where means a perfect negative, +1, and perfect positive relationship and 0 mean no linear relationship.

It describes in addition to strength its direction depending addiction. In the case of direct dependence in terms of trend growth in the value of one variable are increasing the value of the variable other. Otherwise, and in inverse relation to the tendency, along with the growing value of one variable decrease the value of the variable other.

First we calculate correlation coefficient. Procedure is that:

$$r = Cov(X, Y) / \sqrt{Var(X)Var(Y)} \quad (1)$$

Where: Cov(y,x) is the covariance of y and x, Var(x) is the variance of x and Var(y) is the variance of y.

Covariance provides a measure of the strength of the correlation between two or more sets of random variates. The covariance for two random variates X and Y , each with sample size N, is defined by the expectation value.

$$cov(X, Y) = \langle (X - \mu_X)(Y - \mu_Y) \rangle, \quad (2)$$

where $\mu_x = \langle X \rangle$ and $\mu_y = \langle Y \rangle$ are the respective means, which can be written out explicitly as follows:

$$cov(X, Y) = \sum_{i=1}^N \frac{(x_i - \bar{x})(y_i - \bar{y})}{N}. \quad (3)$$

For uncorrelated variates, the covariance is zero. However, if the variables are correlated in some way, then their covariance will be different from zero. In fact, if $cov(X, Y) > 0$, then Y tends to increase as X increases, and if $cov(X, Y) < 0$, then Y tends to decrease as X increases.

$$cov(X, Y) = \langle X Y \rangle - \mu_X \mu_Y = \langle X \rangle \langle Y \rangle - \mu_X \mu_Y = 0, \quad (4)$$

The variance is a measure of how spread out the values of X would be if the experiment leading to X were repeated a number of times. The variance of X, written as Var(X) is given by:

$$Var(X) = E(X)^2 - (E(X))^2 \quad (5)$$

If we write $E(X) = \mu$ then:

$$\text{Var}(X) = E(X^2) - \mu^2 \quad (6)$$

The variance of Y, written as $\text{Var}(Y)$ is given by:

$$\text{Var}(Y) = E(Y^2) - (E(Y))^2 \quad (7)$$

If we write $E(Y) = \mu$ then:

$$\text{Var}(Y) = E(Y^2) - \mu^2 \quad (8)$$

In this paper, we use regression analysis for the estimations. Regression analysis deals with dependence of a quantitative variable on one or more quantitative variables. In the case of one variable depending on another variable, we talk about simple regression, as opposed to the case when there are more explanatory variables. Regression analysis aims to find a mathematical relation – an equation which in a certain sense describes changes of a random variable Y dependent on changes of random variables X_1, X_2, \dots, X_k . We shall assume the standard case presented in literature, i.e. the case when only some values of the variables X_1, X_2, \dots, X_k are known or available.

The objective of regression is to estimate the unknown parameters. The regression equation simply describes the relationship between the dependent variable (y) and the independent variable (x). The intercept, or "a", is the value of y (dependent variable) if the value of x (independent variable) is zero.

The parameters of the regression line:

$$b = \text{cov}/\text{var } x \quad (10)$$

$$a = \bar{y} - b \cdot \bar{x} \quad (11)$$

The regression equation:

$$y = a + b \cdot x \quad (12)$$

4. Results and Discussion

The following lines are devoted to the analysis of selected economic indicators. It is the development of selected macroeconomic indicators in the years 2001 to 2015. These indicators are average unemployment rate, GDP and the average growth rate of real wages. Following the evaluation, depending average unemployment rate for the total attendance at collective accommodation establishments in the Czech Republic in the period from 2001 to 2015. Another important indicator is rated dependency developments GDP to total attendance in 2001 and 2015. The final result is the assessment of development depending average growth rate of real wages in total attendance from 2001 to 2015.

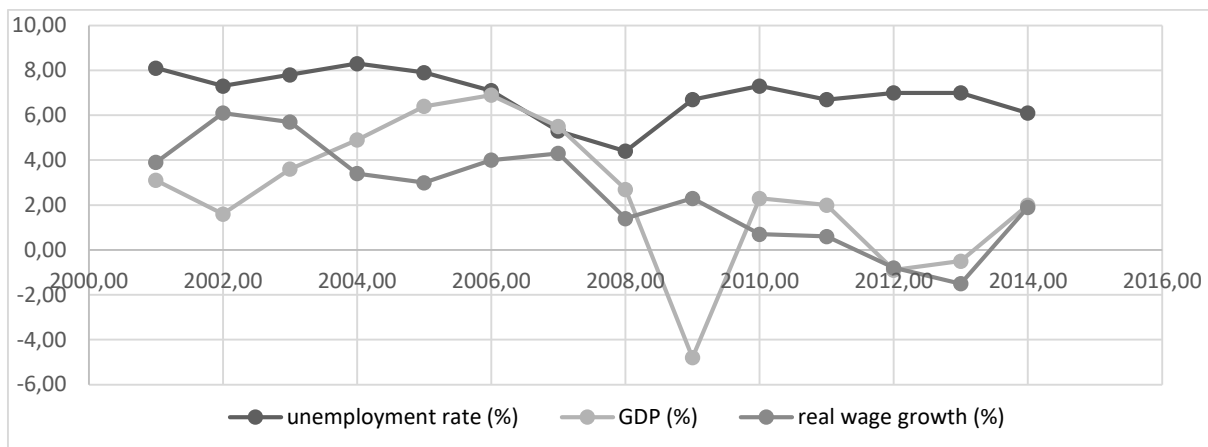


Fig. 2: Development of selected economic indicators in the Czech Republic between 2001 - 2015

(Source: Own elaboration based web portal Czech Statistical Office: Hlavní makroekonomické ukazatele. [online][vid. 29. září 2016]. Dostupné z: https://www.czso.cz/csu/czso/hmu_cr)

The second figure shows us the evolution of the average unemployment rate, GDP and the average growth rate of real wages. This is the data from the years 2001 to 2015. The chart shows that in 2009 there was a significant decline in GDP. Which could result in ongoing global economic crisis. The average growth rate of real wages declined from 2001 to 2013, in 2014 there was an increase in 2015 and to hold. The average unemployment rate remains at similar levels, a significant decrease was only in 2008.

In this part of the paper the authors compiled Correlation described in Table 1, which shows the development of values occupancy of spa accommodation facilities, the average unemployment rate (%) and calculated the parameters required for the calculation of correlation. The authors investigated the dependence of the average unemployment rate (in %) on the overall attendance at collective accommodation establishments in the Czech Republic during the period 2001 – 2015.

Tab. 1: Dependence of average unemployment rate (%) on total attendance at collective accommodation establishments in the Czech Republic during the period 2001-2015

Year	(xi) Total number of guests	(yi) unemployment (%)	$X_i * Y_i$	X_i^2	Y_i^2
2001	11 283 185	8,1	91393798,5	127310263744225	65,61
2002	10 415 255	7,3	76031361,5	108477536715025	53,29
2003	11 346 482	7,8	88502559,6	128742653776324	60,84
2004	12 219 689	8,3	101423418,7	149320799256721	68,89
2005	12 361 793	7,9	97658164,7	152813926174849	62,41
2006	12 724 926	7,1	90346974,6	161923741705476	50,41
2007	12 960 921	5,3	68692881,3	167985473168241	28,09
2008	12 835 886	4,4	56477898,4	164759969404996	19,36
2009	11 985 909	6,7	80305590,3	143662014556281	44,89
2010	12 211 878	7,3	89146709,4	149129964286884	53,29
2011	12 898 712	6,7	86421370,4	166376771258944	44,89

2012	13 646 913	7	95528391	186238234429569	49
2013	13 868 336	7	97078352	192330743408896	49
2014	15 587 076	6,1	95081163,6	242956938229776	37,21
2015	17 195 550	5	85977750	295686939802500	25
Σ	193542511,0	102,0	1300066384	2537715969918710	712,180
Averages	12902834,06	6,8	86671092,267	169181064661247	47,479

Source: Own processing

Formulas, in the methodological part, is used to calculate the parameters for determining the correlation coefficient.

$$cov\ xy = 3342744821839,13$$

$$var\ x = 2697937709313,25 \quad var\ y = 1,24$$

The correlation coefficient:

$$r = -0,6$$

$$R^2 = 34,13 \%$$

With a correlation coefficient of -0.6, we can say that if the value of the correlation coefficient, closer to -1, it means that the dependence between the selected is stronger but indirect. In our case it is a slight linear independence. With the increasing number of guests at collective accommodation establishments in the Czech Republic in the first 2 001-2 015, the average unemployment rate is falling. The increasing number of guests affects the average unemployment rate of 39.34%.

By obtaining these values, we calculated the parameters of the regression line, and then we fit to the regression equation for the years 2001 and 2015.

The parameters of the regression are:

$$b = -0,000000396$$

$$a = 11,90854692$$

The line equation is:

$$y_{2001} = -0,17230630$$

$$y_{2015} = -0,293887164$$

The equation of the regression line is shown in Figure 3 and shows a slight indirect linear dependence. In this case, the growth of occupancy in the collective accommodation establishments in the Czech Republic in the period 2 001 - 2015 in the Czech Republic leads to a reduction in the average unemployment rate, especially between 2 005 - 2007 and 2014 - 2015.

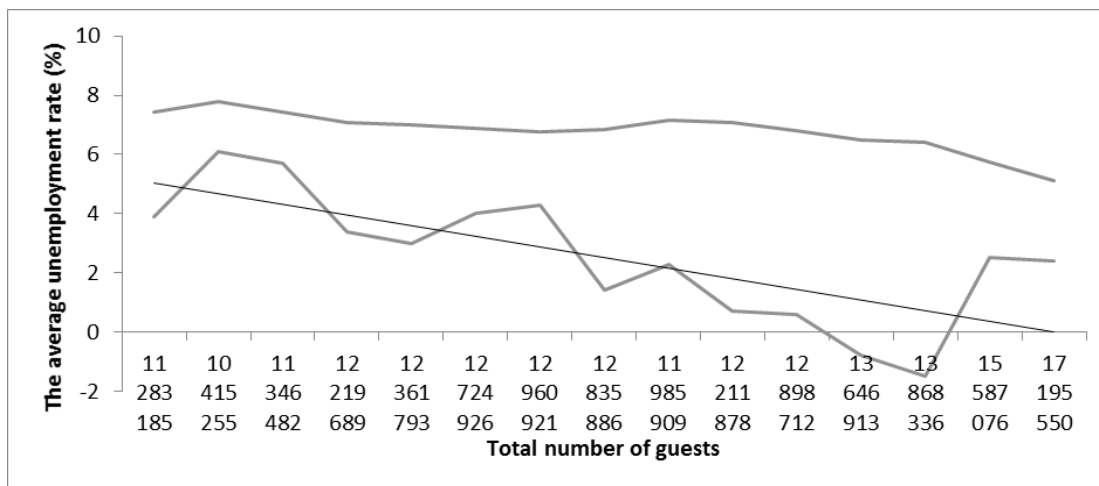


Fig. 3: The average rate of unemployment (in %) in total attendance at collective accommodation establishments in the Czech Republic during the period 2001-2015

(Source: Own processing)

Correlation in Table 2 were prepared, which it reflects the values for the period 2001 - 2015. The Values are spa guests and GDP and they calculated the parameters. Authors examine the development of dependence GDP (%) the overall attendance at collective accommodation establishments in the Czech Republic during the period 2001 - 2015.

Tab. 2 Dependence of development GDP (%) in total attendance at collective accommodation establishments in the Czech Republic during the period 2001-2015

Year	(xi) Total number of guests	(yi) GDP (%)	$X_i * Y_i$	X_i^2	Y_i^2
2001	11 283 185	3,1	34977873,5	127310263744225	9,61
2002	10 415 255	1,6	16664408	108477536715025	2,56
2003	11 346 482	3,6	40847335,2	128742653776324	12,96
2004	12 219 689	4,9	59876476,1	149320799256721	24,01
2005	12 361 793	6,4	79115475,2	152813926174849	40,96
2006	12 724 926	6,9	87801989,4	161923741705476	47,61
2007	12 960 921	5,5	71285065,5	167985473168241	30,25
2008	12 835 886	2,7	34656892,2	164759969404996	7,29
2009	11 985 909	-4,8	-57532363	143662014556281	23,04
2010	12 211 878	2,3	28087319,4	149129964286884	5,29
2011	12 898 712	2,0	25797424	166376771258944	4
2012	13 646 913	-0,8	-10917530	186238234429569	0,64
2013	13 868 336	-0,5	-6934168	192330743408896	0,25
2014	15 587 076	2,7	42085105,2	242956938229776	7,29
2015	17 195 550	4,5	77379975	295686939802500	20,25
Σ	193542511	40,1	523191277	2537715969918710	236
Averages	12902834	2,6	34879418,4	169181064661247	15,7

Source: Own processing

Formulas, in the methodological part, is used to calculate the parameters for determining the correlation coefficient.

$$cov\ xy = 385842,0684$$

$$var\ x = 2697937709313,25 \quad var\ y = 8,59$$

The correlation coefficient:

$$r = 0,1$$

$$R^2 = 64,26\ \%$$

With a correlation coefficient of 0.1, we can say that if the correlation coefficient is around 0, it means that the dependence between the selected variables is almost none.

By obtaining these values, we calculated the parameters of the regression line, and then we fit to the regression equation for the years 2001 and 2015.

The parameters of the regression are as:

$$b = 0,000000143$$

$$a = 0,827717892$$

The line equation is:

$$y_{2001} = 0,06223956$$

$$y_{2015} = 0,106156356$$

The regression equation is illustrated in Figure 4 and it shows the dependence of the development of GDP (%) in total attendance at collective accommodation establishments in the Czech Republic during the period 2001 – 2015.

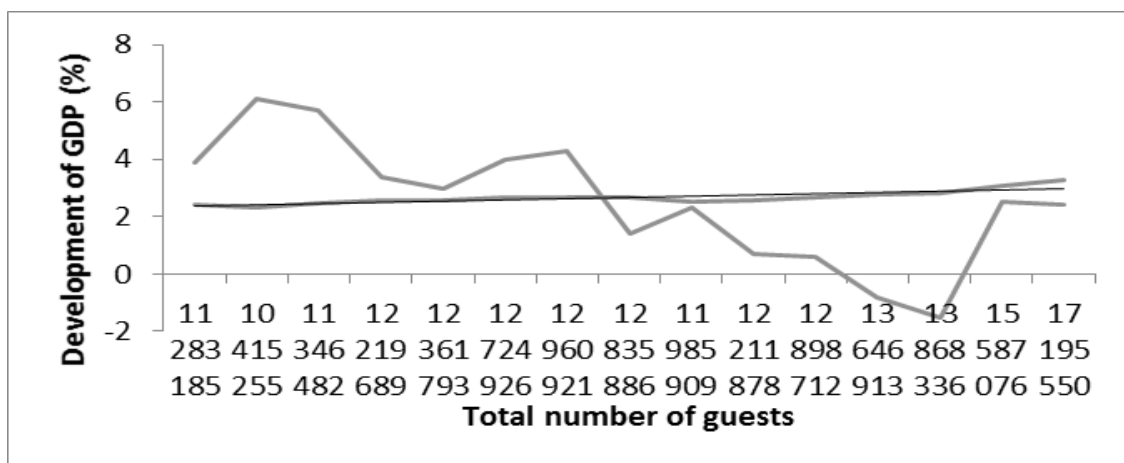


Fig. 4 Dependence of development GDP (%) in total attendance at collective accommodation establishments in the Czech Republic during the period 2001-2015

(Source: Own processing)

Correlation coefficients on Table 3 show the values for the period 2001-2015 and for spa guests, and attendance time at the annual average real wage growth (%) and calculated the parameters. The authors examine the dependence of real wage growth (%) the overall

attendance at collective accommodation establishments in the Czech Republic during the period 2001 - 2015.

Tab. 3 The evolution of the average pace of real wage growth (%) for total attendance at collective accommodation establishments in the Czech Republic during the period 2001-2015

Year	(xi) Total number of guests	(yi) the growth rate of real wages (%)	Xi * Yi	Xi2	Yi2
2001	11 283 185	3,9	44004421,5	127310263744225	15,21
2002	10 415 255	6,1	63533055,5	108477536715025	37,21
2003	11 346 482	5,7	64674947,4	128742653776324	32,49
2004	12 219 689	3,4	41546942,6	149320799256721	11,56
2005	12 361 793	3	37085379	152813926174849	9
2006	12 724 926	4	50899704	161923741705476	16
2007	12 960 921	4,3	55731960,3	167985473168241	18,49
2008	12 835 886	1,4	17970240,4	164759969404996	1,96
2009	11 985 909	2,3	27567590,7	143662014556281	5,29
2010	12 211 878	0,7	8548314,6	149129964286884	0,49
2011	12 898 712	0,6	7739227,2	166376771258944	0,36
2012	13 646 913	-0,8	-10917530,4	186238234429569	0,64
2013	13 868 336	-1,5	-20802504	192330743408896	2,25
2014	15 587 076	2,5	38967690	242956938229776	6,25
2015	17 195 550	2,4	41269320	295686939802500	5,76
Σ	193542511,0	38,000	467818758,	2537715969918710	162,9
Averages	12902834,0	2,533	31187917,2	169181064661247	10,864

Source: Own processing

Formulas, in the methodological part, is used to calculate the parameters for determining the correlation coefficient.

$$cov\ xy = 12041165790436,00$$

$$var\ x = 2697937709313,25 \quad var\ y = 4,46$$

The correlation coefficient:

$$r = -0,4$$

$$R^2 = 18,67\%$$

With a correlation coefficient of -0.4, it is a weak indirect linear dependence. In this case, increasing the number of guests influenced the development of the average pace of real wage growth (%) of 18,67%.

By obtaining these values, we calculated the parameters of the regression line, and then we fit to the regression equation for the years 2001 and 2015.

The parameters of the regression are:

$$b = -0,000000556$$

$$a = 9,703192875$$

The parameters of the regression are:

$$y_{2001} = -0,24184361$$

$$y_{2015} = -0,412490613$$

The regression equation is illustrated in Figure 5 and shows the dependence of the development of an average pace of real wage growth (%) for total attendance at collective accommodation establishments in the Czech Republic during the period 2001 - 2015. In this case, the variables being monitored is weak indirect linear relationship.

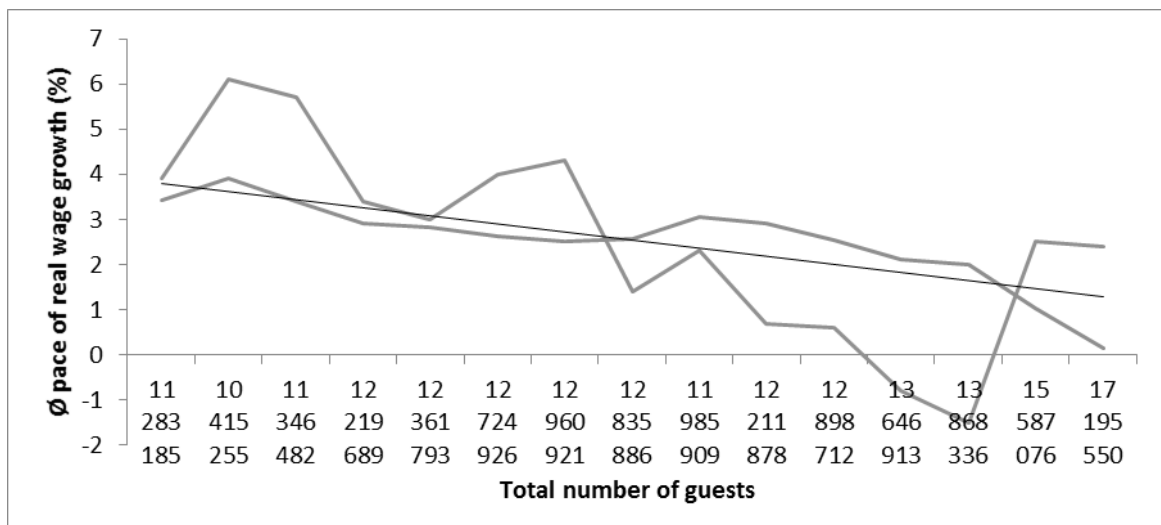


Fig. 5 Dependence of average development rate of real wage growth (%) for total attendance at collective accommodation establishments in the Czech Republic during the period 2001-2015

(Source: Own processing)

Conclusion

The aim of this paper is to assess the impact of occupancy in collective accommodation establishments in the Czech Republic at an average rate of unemployment (%) to GDP (%) and the average pace of real wage growth (%) between 2001-2015. The first parameter, it is the influence of guests at collective accommodation establishments in the Czech Republic at an average rate of unemployment (%), it was shown that the dependence between parameters is stronger but indirect. We can conclude that the increasing number of guests affects the average unemployment rate of 39.34%. It follows that the growth in occupancy collective accommodation establishments reduces the average unemployment rate. It can be stated that they are produce a new job opportunity. It should be noted that jobs are affected by seasonality in tourism, this trend can be verified from the pages of the Czech Statistical Office, namely the Tourism Satellite Account.

The following comparisons of GDP growth parameters and occupancy collective accommodation establishments, using relevant statistical methods, it showed no linear relationship. Generally, tourism has such influence to support the development of small and medium-sized businesses, stimulate investments in local infrastructure, increasing the general

educational level and living standard of the population. The last variable, then it was the assessment of development depending average growth rate of real wages in total attendance in the years under collective accommodation establishments. There has been demonstrated indirectly weak linear dependence. Influence cannot be considered significant. It follows that the biggest influence of increasing occupancy collective accommodation establishments has an average unemployment rate.

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