EDUCATION AS A DETERMINING FACTOR OF UNEMPLOYMENT AND ECONOMIC DEVELOPMENT ON A REGIONAL LEVEL

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Abstract

The authors of the contribution aim to verify the hypothesis that "Regions requiring concentrated attention (RRCA) have a below-average reproduction of educated and qualified population". The verification bases on analysis and other activities. The target is to determine whether there is a relationship between factor F1 – unemployment and the educational level. Regarding the availability of data for the whole population, the relationship could be judged directly by using characteristics of population. However, only a sample was used to verify the hypothesis. The selection of the sample was made considering what could be the best data to investigate the hypothesis. We used the methods of descriptive statistics to analyse the sample and we judged the relationship of factor F1 and education using Eta squared and Pearson's R.

Introduction

The contribution was compiled with support of the Ministry for Regional Development Nr. WD-30-07-1 "Innovation Approach to the Solution of Disparities on Regional Level". Its aim is to formulate measurements to lower interregional disparities in economic development in the Czech Republic, accelerating economic performance expressed by a higher share of the regions on GDP formation, in other words improving the living standard of the population in the regions. Accomplishing this aim is divided into many other partial activities. The authors solve the issues connected with the activity A 911 "Suggesting measurements to increase absorption of business support in regions requiring concentrated attention." They focus on verifying hypothesis Nr. 3: "Regions requiring concentrated attention (RRCA) have a below-average reproduction of educated and qualified population and a deficit of business invention and investment capital".

This contribution is based on outputs published earlier either by the authors or other members of the research team. It develops some of the issues further. Publications [2, 4, 5] were the starting point for this contribution. A fundamental research scheme of the project was aimed at working out a new methodology of identifying regions requiring concentrated state support and revealing determining factors which cause the differences in economic development of regions, measuring their importance and suggesting measurements which support diminishing interregional disparities [5]. The factor F1 – UNEMPLOYMENT is elaborated in more detail in this contribution.

The authors have done the present research on the basis of the given methodology. Primarily they worked out a theoretical base of researched issues presented in [3]. The theory presented an analysis of a current level of understanding mutual conditionalities and interlink of real phenomena such as education, unemployment and economic growth. Two main hypotheses were discussed. The first hypothesis: the higher the education a person has achieved, the lower the risk of being unemployed. The second hypothesis: the better qualified the population is, the higher the economic growth in economy. The authors paid attention to new ideas in theory of economic growth connected with human capital, particularly the higher and higher significance of qualification and education. The dynamic development of modern branches leads to a considerable decrease in the number of nonqualified job positions. However, this trend increases the threat of unemployment of people who either do not have any education or have completed an education which does not correspond with the needs of currently developing branches.

The analysis of hypothesis and selecting methods for the statistical survey were the second step in the activity A 911, verifying hypothesis Nr. 3 (see above). The research file of municipalities, which is used for analysing the relation between the educational level of population, unemployment and economic development, comes out of the data provided by the Czech Statistical Office from the population census in 2001 and from the project WD-30-07-1 database of methodology of identifying low dynamics of development (LDD) of municipalities, concretely according to the factor F1. The research file included 1,000 municipalities in the Czech Republic which were randomly selected from the database WD-30-07-1 according to the Methodology of Identifying Dynamics in Municipality Development [6]. The results of this research phase were published in [1]. On the basis of analysis of variance applied to 1,000 randomly selected municipalities and accomplished by Chi-squared test of independence in 2 by 2 table, the authors proved a weak and positive dependence of the factor F1 on the level of education. It means we can expect a higher level of education in strong municipalities and a lower level of education in weak municipalities.

Presenting the next part of the research in this contribution is the third step of the research. The main aim is to judge if the Regions requiring concentrated attention (RRCA) have a below-average reproduction of educated and qualified population and determine if there is a relation between the factor F1 – unemployment and education in the finite population.

1 Factor analysis as a tool for classifying municipalities as week and strong in the Czech Republic

The base for classifying municipalities as weak and strong was the factor analysis. The factor analysis was made by other members of the research team in the initial phase of the project. The achieved results were published e.g. in [5]. The factor analysis identified unemployment as factor F1 as it was found as the weightiest criterion (from the variability point of view) for evaluating municipality development. This factor includes the following important indicators:

- rate of registered unemployment,
- rate of long-term unemployment and
- pressure on job positions.

This factor is a minimizing factor. It means the lower (the more negative) its value, the better characteristics of the indicator – in more detail published in [5].

The boundary value of a low dynamic development within the factor F1 – unemployment was set on the level of the last positive value, which belongs to municipality Dráchov.

Unemployment is evaluated as a significant factor decelerating the economic development of municipality by 2,581 municipalities out of 6,240 (approximately 41 per cent)

For completeness' sake, the highest share of weak municipalities according to the factor F1can be found in Ústí nad Labem Region – it is 94.6 per cent out of the total number of municipalities in Ústí nad Labem Region. Moravian – Silesian Region (77.3 per cent), Karlovy Vary Region (74.2 per cent), South Moravian Region (55.4 per cent) and Olomouc Region (54.9 per cent) belong among regions with more than 50 per cent of weak municipalities out of the total. The South Bohemian Region (22.7 per cent of weak municipalities), the Central Bohemian Region (23.6 per cent), Plzeň Region (27.9 per cent), Hradec Králové Region (32.1 per cent), Pardubice Region (34.7 per cent), Vysočina Region (37.4 per cent), Liberec Region (39.5 per cent) and Zlín Region (42.1 per cent) belong among regions where unemployment is not the main factor which restrains the municipality development. We cannot forget about the Capital City Prague where the value of F1 is low.

2 Business inventions and investment capital in regions requiring concentrated attention

As mentioned in the introduction, the aim of the research is to find out if Regions requiring concentrated attention (RRCA) have a deficit of business inventions and investment capital. For this purpose the data about municipalities in the Czech Republic provided by the Czech Statistical Office was divided into two groups. The selection used the project database WD-30-07-1 [6]. The municipalities were ordered according to factor F1 – unemployment, and then divided into strong municipalities (the value of factor F1 was low) and weak municipalities (the value of factor F1 was high). Regarding the large scale of the file, we selected 500 strongest and 500 weakest municipalities according to factor F1 and did the research with these municipalities only. We used the intentional selection because we assumed that the differences between strong and weak municipalities would be emphasized.

We selected data about numbers of businessmen between the years 2000 and 2001. We chose this period because of the need to compare the data which were the base for selecting weak and strong municipalities. We investigated how big was the increase or decrease in the number of business units between 2000 and 2001. We initially assumed that if the number of business units in the municipality increases, it may mean the increase in job positions and capital inflow or other business inventions.

After we prepared input data for the analysis, we counted the absolute differences in the selected 500 weakest and 500 strongest municipalities according to factor F1. The frequency distribution of the absolute differences between businessmen numbers in strong and weak municipalities between the years 2000 and 2001 is in *Figure 1*.

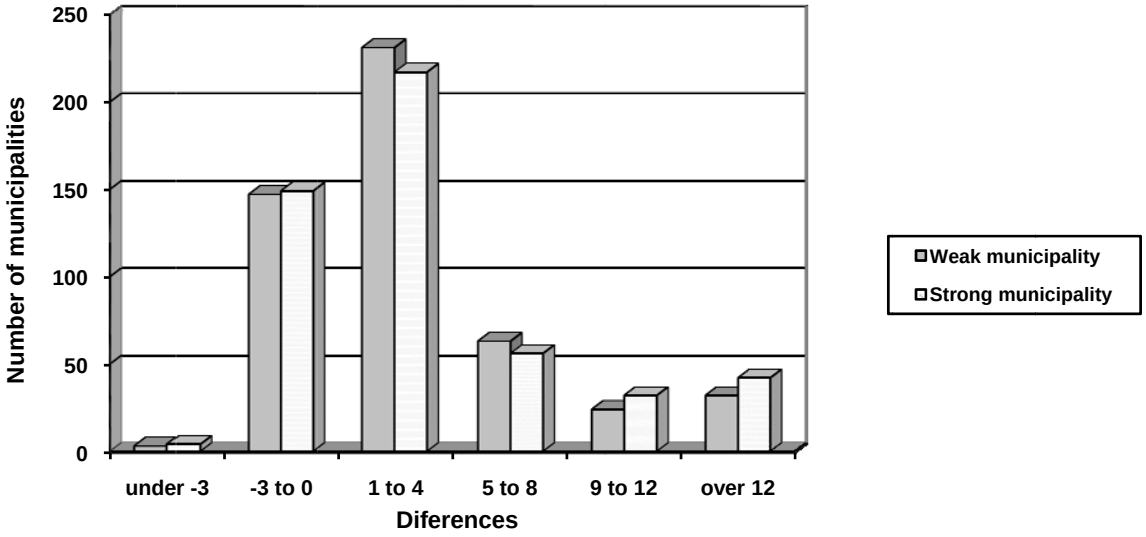

Figure 1 Strong and weak municipalities according to an absolute difference of businessmen numbers between the years 2000 and 2001 (authors, data from the Czech Statistical Office and a database of the project WD-30-07-1)

The picture shows a similar frequency distribution in both types of municipalities. If we figure these in the Box-and-Whisker Plot, the comparison looks different.

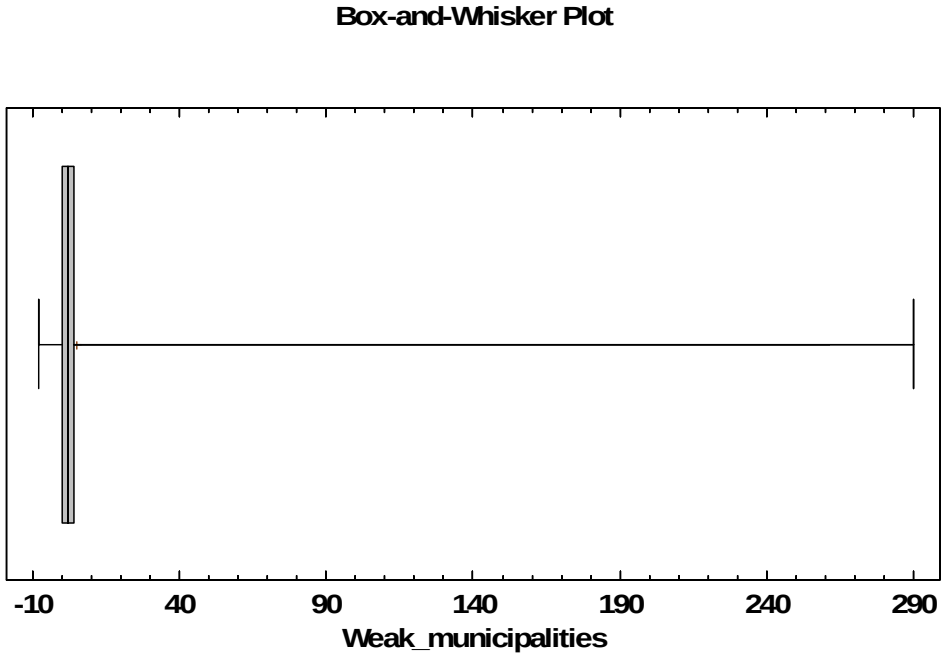

Figure 2 Box-and-Whisker Plot of the absolute difference of businessmen numbers in the file of weak municipalities (authors, data from the Czech Statistical Office and a database of the project WD-30-07-1)

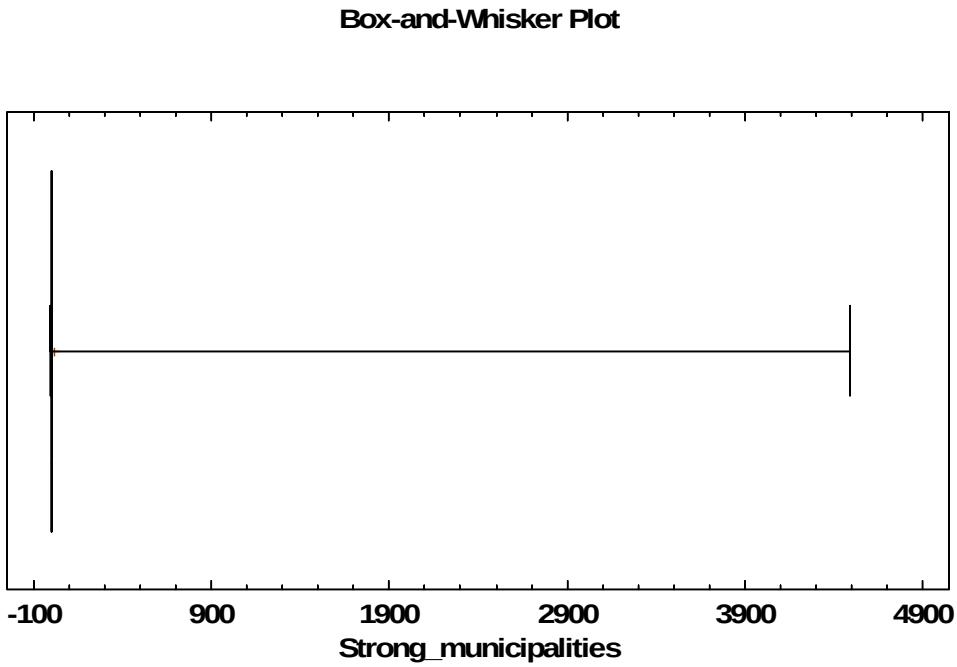

Figure 3 Box-and-Whisker of the absolute difference of businessmen numbers in the file of strong municipalities (authors, data from the Czech Statistical Office and a database of the project WD-30-07-1)

We have added the calculation of the selected characteristics. It helps us imagine the value distribution in both files. *Table 1* shows the extreme values, arithmetic mean and standard deviation of differences in both files.

Tab. 1 Selected characteristics of absolute differences of businessmen numbers in the files of weak and strong municipalities (authors, using data from the Czech Statistical Office)

Characteristics	Weak municipalities	Strong municipalities
Minimum	-8	-7
Maximum	290	4,491
Average	4.9	15.2
St. deviation	17.1	201.3

We can see that the minimum value of absolute difference is -8 in the weak municipality file, -7 in the strong municipality file. The maximum gain is 290 by weak municipalities, 4,491 by strong municipalities. The extremely high values of gains in the file of strong municipalities cause that the value of arithmetic mean (15.2) is significantly higher than the value of weak municipality file (4.9). We have to consider if the value 4,491 is the outlier which negatively influences the accuracy of the results. The test of the hypothesis, using STATGRAPHICS CENTURION XVI, proved that this wass the outlier. Anyway, this finding does not allow us to exclude this observation of the file. If we look at which municipality embodies such a high increase in numbers of businessmen, we conclude it is Prague. Regarding the fact that most economic indicators in Prague significantly differ from other municipalities, we decided to omit this observation from the strong municipality file. *Table 2* provides the recounted values

of the selected characteristics and *Figure 4* presents a Box-and-Whisker Plot of absolute differences of businessmen numbers in the files of weak and strong municipalities - excluding Prague.

Tab. 2 Selected characteristics of absolute differences of businessmen numbers in the files of weak and strong municipalities - excluding Prague (authors, using data from the Czech Statistical Office)

Statistic	Weak municipalities	Strong municipalities
Minimum	-8	-7
Maximum	290	169
Average	4.9	6.2
St. deviation	17.1	18.9

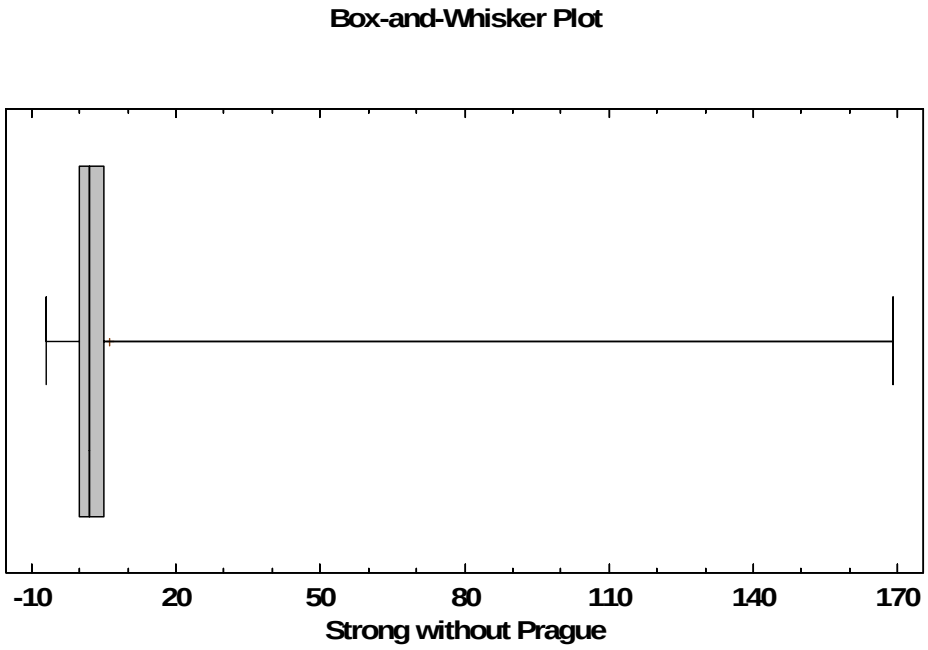

Figure 4 Box-and-Whisker Plot of absolute differences of businessmen numbers in the files of weak and strong municipalities - excluding Prague (authors, data from the Czech Statistical Office and a database of the project WD-30-07-1)

If we exclude the value 4,491 (Prague), the values of the characteristics in both files do not differ so significantly. We also tested other values of absolute gains, which could be outliers – concretely the value 290 (Most) in the weak municipality file and 169 (Mladá Boleslav and Pelhřimov) in the strong municipality file. Even the test is significant by all these values; we are not aware of any logical reason why to omit them. We do not have detailed information about the development of businessmen numbers in these municipalities; anyway, regarding the further development of the indicator we do not see a reason why these should be omitted.

To conclude we can enunciate that the number of businessmen in both types of municipalities increased on average in the time period we focused on. There are higher increases in the

strong municipality file, which proves our assumption, that if the number of business units in the municipality increases, it may mean an increase in the number of job positions and capital inflow as well as other business inventions. As a result of that, unemployment may decrease.

3 The relation between the level of education and unemployment

Initially, our aim was to verify the hypothesis that there is a dependence of the factor F1 – unemployment on the level of education in the municipality. We verified this hypothesis in earlier activities published in [1]. We worked with the file of 1,000 randomly selected municipalities, which supplied data about the level of labour force over 15 years old. The analysis of variance (at the 0.05 level of significance) proved that the factor F1 depends on the level of education. The value of Eta squared 0.0012 witnesses a very low dependence of factor F1 on the educational level.

Regarding the fact that we have data available about all municipalities in the Czech Republic, we do not need to test them, but we count the characteristics of the population. The way we count this is demanding, so as to the scale of the file; anyway, it is not unrealistic. The value of Eta squared is 0.045. The data in the correlation table – see *Table 3* – were the base for counting. This table includes the data about labour force over 15 years old according to the level of education, and it distinguishes between weak and strong municipality population according to F1.

Tab. 3 Correlation table - labour force over 15 years old according to the level of education (authors, data from the Czech Statistical Office and a database of the project WD-30-07-1)

Level of education	**Factor F1 – unemployment**	
	low	high
Without education	20,506	17,415
Basic schools, unfinished education	831,667	1,142,918
Secondary schools education without a school-leaving exam	1,241,252	2,013,493
Secondary schools education with a school-leaving exam	693,064	1,441,527
Advanced vocational training	88,824	207,393
University education	190,669	571,697

As visible from the Eta squared, the dependence of the factor F1 on the educational level of the population is weak. Only 4.5 per cent of variability of the factor F1 can be explained by the educational level.

Let us try to add information if there is a positive or negative dependence of the factor F1 on the educational level. The Eta squared does not provide this information; we found it out from the Pearson's R. We work with the data about the level of education of labour force in weak and strong municipalities in the Czech Republic again. To be able to count the Pearson's R, we need to transform the education variable. This variable assumes six unique values. We have changed the variable to an alternative variable – a variable with only two unique values. We have classified the level of education as high and low. We have ranked the first three levels of education (without education, basic schools, unfinished education; secondary schools education without a school-leaving exam) and we have ranked the other three to a

group with high education (secondary schools education with a school-leaving exam, advanced vocational training, university education). We have got the following 2 by 2 table – see *Table 4* – and we have counted the Pearson's R.

Tab. 4 2 by 2 table of variables – educational level and the factor F1 (authors, data from the Czech Statistical Office and a database of the project WD-30-07-1)

Factor of unemployment (F1)	**Level of education**	
	Low	High
high (weak municipalities)	2 093 425	972 557
low (strong municipalities)	3 173 826	2 220 617

Pearson's R from the population is 0.094. This represents a weak dependency of variables; however, the value is positive. We can expect that the educational level of population is low in weak municipalities and high in strong municipalities. The result supports our assumption.

In conclusion, both analyses point at the necessity to look for other factors which can influence factor F1 more than the educational level. The value of the factor F1 depends on the educational level; however, the dependency is weak. That is why it is necessary to look for other factors which influence the factor F1- unemployment more.

Conclusion

The aim of the contribution is to verify the hypothesis that "Regions requiring concentrated attention (RRCA) have a below-average reproduction of educated and qualified population and a deficit in business inventions and investment capital". While verifying this hypothesis, the authors tried to prove that the value of the factor F1 depends on the educational level. They found out that the factor F1 depends on the educational level, and that the dependency is weak. The substantial thing is that the Pearson's R 0.094 showed a positive dependence. It means we can more often register a case of weak municipalities with a lower-educated population and strong municipalities with a higher-educated population. This confirms our assumption. Necessarily we need to look for other factors which influence unemployment more than the level of education. Anyway, there are more different factors, which may influence unemployment. The future task is to identify these and to determine how strong the influence on the unemployment is. This requires constructing a multiple-variable model which describes the dependence better.

As a result of further activity the authors found out that there are higher absolute differences in the numbers of businessmen in the studied period in strong municipalities compared to the weak ones. The authors conclude that if the number of business units increases, an increase in the number of job positions, capital inflow and inventions can be expected. As a result of that, this development leads to the unemployment decrease in the municipality.

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VZDĚLÁNÍ JAKO FAKTOR DETERMINUJÍCÍ ÚROVEŇ NEZAMĚSTNANOSTI A EKONOMICKÉHO ROZVOJE NA REGIONÁLNÍ ÚROVNI

Autorky příspěvku si kladou za cíl na základě analýzy a dalších aktivit verifikovat hypotézu, že „RVSP (Regiony vyžadující soustředěnou pozornost) mají podprůměrnou reprodukci vzdělaného a kvalifikačního potenciálu obyvatelstva (populace)“ a určit, zda existuje vztah mezi faktorem F1 – nezaměstnanost a vzděláním obyvatel. S ohledem na to, že byla k dispozici data za celý základní soubor, bylo možné posuzovat tento vztah přímo pomocí charakteristik základního souboru. Pro ověření výše uvedené hypotézy však byla použita jen některá data, vybraná ze základního souboru, o kterých bylo možné se domnívat, že umožní provést zkoumání nejlépe. Při práci s těmito vybranými údaji jsme použili metody deskriptivní statistiky, při posuzování vztahu mezi faktorem F1 a vzděláním poměr determinace a koeficient asociace.

DIE BILDUNG ALS FAKTOR, DER DIE HÖHE DER ARBEITSLOSIGKEIT UND DEN STAND DER ÖKONOMISCHEN ENTWICKLUNG AUF REGIONALER BASIS BEEINFLUSST

Die Autorinnen haben sich zum Ziel gesetzt, eine Hypothese aufgrund einer Analyse und weiteren Aktivitäten zu überprüfen, die aussagt, dass die „Regionen, die besondere Aufmerksamkeit verlangen“, eine weit unter dem Durchschnitt liegende Reproduktion von gebildeten und qualifizierten Einwohnern hervorbringen und uns aufzeigen, ob eine Beziehung zwischen dem Faktor F1 (Arbeitslosigkeit) und dem Bildungsgrad der Einwohner existiert. Da wir die Daten für die gesamte Grundgruppe zur Verfügung hatten, konnten wir diese Beziehung direkt durch die Charakteristiken der Grundgruppe beurteilen. Für die Beurteilung der höherstehenden Hypothese wurden jedoch nur einige Daten aus der Grundgruppe benötigt, wo man der Meinung war, dass diese die Forschung am besten voranbringen können. Bei der Arbeit mit diesen Daten haben wir die Methoden der deskriptiven Statistik benutzt; bei der Beurteilung der Beziehung zwischen dem Faktor F1 und der Bildung benutzten wir ebenfalls die Relation der Determination und den Koeffizient der Assoziation.

WYKSZTAŁCENIE JAKO CZYNNIK DETERMINUJĄCY POZIOM BEZROBOCIA ORAZ ROZWOJU GOSPODARCZEGO NA SZCZEBLU REGIONALNYM

Celem autorów artykułu jest weryfikacja, na podstawie analizy i innych działań, hipotezy, zgodnie z którą w regionach wymagających szczególnej uwagi możliwości odtworzenia potencjału wykształconej i wykwalifikowanej ludności (populacji) są poniżej przeciętnej, a także zbadanie, czy istnieje związek pomiędzy czynnikiem F1 – bezrobocie a wykształceniem mieszkańców. Ze względu na to, że do dyspozycji były informacje z całego bazowego zestawu danych, możliwa była ocena w/w związku bezpośrednio za pomocą cech zestawu bazowego. W celu zweryfikowania powyższej hipotezy wykorzystano jednak tylko niektóre dane, wybrane z zestawu bazowego, co do których można było przypuszczać, że umożliwią przeprowadzenie badania w najlepszy sposób. Wykorzystując wybrane dane zastosowano metodę statystyki deskryptywnej, a przy analizie związku pomiędzy czynnikiem F1 a wykształceniem współczynnik determinacji i współczynnik korelacji.