Use of multi-criteria decision making method for calculating of secondary school efficiency: the case of vocational secondary schools in the Pardubice Region

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Abstract

Multi-criteria decision making techniques are extensively used in selecting the best alternative among the available options, assessed according to selected criteria. It is a suitable tool for evaluating and comparing schools because school efficiency measurement can be seen as a decision-making problem. The aim of this paper is to evaluate vocational secondary schools established by the Pardubice Region using appropriate selected criteria describing efficiency and then rank the schools according to these criteria. We chose suitable criteria which are mainly based on pupils' demand and demand for skilled workers in the labour market. We used the Weighted Sum Method for our analysis. The resulting order of schools ranked according to their efficiency shows that supported fields should be medical, technical and on the other hand, fields that currently show low efficiency are agricultural or gastronomic fields. Our results might be an inspiration for designing an optimal network of vocational secondary schools in the Pardubice Region.

Keywords: *Efficiency, secondary schools, decision making, multi-criteria, weighted sum method*

JEL Classification: *I210, I250, I290, H410*

1 Introduction

The concept of efficiency relates the outcome of a process to its input. A system is said to be efficient if a maximum output is obtained from given input, or if a given output is obtained with minimum input. The output may either be measured as a goal within the education, such as achievement scores or completion rates, or as a goal outside the education, such as employment probabilities or earnings returns on the labour market (Hanushek and Kimko, 2000).

Ryška (2009) states that, education, as well as other sectors of society, began to focus on the efficiency of processes and outputs in the second half of the twentieth century, when input tracking was replaced by the monitoring and evaluation of outputs. The education sector has traditionally focused primarily on the entry and process characteristics of school education. However, for example, information about spending per pupil could not say anything about the efficiency of using funds.

Evaluation of efficiency in education is most often associated with the idea of the link between spending on one hand and educational achievements on the other. There are various definitions of education efficiency in strategic documents of the OECD countries (ČSI, 2014). The relationship between education performance on one hand and financial allocation on the other (the value-for-money concept) is the most frequently mentioned definition (e.g. in England, Slovakia, Spain, the United States, etc.). Transition through the education system (e.g. in Denmark), consolidation of the school administration system (e.g. in Austria and Finland), and optimization of school size (e.g. in Norway) are less frequently cited education efficiency concepts. In the case of the Czech Republic, the evaluation of efficiency in education is most often cited in connection with the optimization of the network of primary and secondary schools. In the Czech Republic, the most striking problems for achieving higher efficiency in education, specifically in the area of upper secondary education, are as follows.

In recent times, the Czech Republic faces the problem of the lack of pupils of upper secondary schools in terms of school capacity. There is an excess supply (capacity of schools) over demand (number of pupils). This situation is mainly caused by a long-term decline in birth rates when the number of secondary school pupils is decreasing, but the current inappropriate funding system also plays an important role. All these effects reduce the efficient use of public resources (EDUIN, 2018).

The most frequent problems of upper secondary education are discussed in vocational schools, especially in apprenticeships. In this type of schools, the quality is very low and this education is very uneconomical or inefficient: consumption of high finance without added value in the form of successful graduates. There is high degree of failure in this study, high number of upper secondary school pupils leaving this education system before passing the final exam (EDUIN, 2018). Apprenticeship graduates show the highest unemployment rate in the labour market (Infoabsolvent.cz, 2018). Research POSPOLU (2013) shows that one of the most frequent employers' demands is the practice of applicants. However, apprentices spend little time in the real work environment within theirs vocational training. Companies complain about the very low practical skills of graduates.

The aim of this paper is to evaluate vocational secondary schools established by the Pardubice Region on the basis of appropriately selected criteria describing efficiency and then rank the schools according to these criteria. We used multi-criteria decision making method (MCDM). The key element of this method is the determination of the weights of the individual criteria. We used the opinion of experts in the field of education for this purpose.

1.1 Criteria for evaluating schools

We chose suitable criteria for achieving the goals based on the research of the approaches of OECD countries in the context of the quality and especially efficiency of education.

The Nordic countries emphasize increasing the proportion of young people achieving secondary or tertiary education in their education policy documents. These countries focus on equal opportunities, which is understood in terms of equal access to high quality education for all regardless of age, gender, origin, language, or other characteristics of the pupils. Attention is also paid to the links between education and the labour market with the declared support to those fields there is demand on the labour market. The basic ambition of Danish education documents is world excellence when contemporary Danish children will be the best educated generation in the country's history. Finland emphasizes the links between education funding and student achievements. Normative funding is partly depends on the achieved educational goals (ČŠI, 2014).

Ireland, Slovakia, Spain, Italy or Poland highlights the need for consistency between educational supply and demand in the labour market and increasing the number of high-quality schools while respecting the support needs of disadvantaged pupils and lagging schools (ČŠI, 2014). The general trend of the reform process of the Polish education system is to strengthen the results-oriented management system (Dabrowski and Wisniewski, 2011).

Germany, Austria, Switzerland and Denmark perceive also an important need for consistency between supply and demand in the labour market. There is a dual vocational training system in these countries. The quality of education is closely related to successful school completion and the transition between levels of education and the transition between education and the labour market (Deissinger and Hellwig, 2005). Germany also focuses on promoting integration into the education of people with a migrant background (ČŠI, 2014).

From the literature review it is obvious that most countries believe that the labour force entering the labour market should be sufficiently trained, should be able to adapt to changing conditions and continue to learn. However, a well-functioning link between the educational sphere and the world of work is essential to enable the school system to respond to the changing demands and needs of the labour market.

The following Table 1 briefly describes the selected criteria for our analysis.

Table 1 – Selected criteria for the analysis and the reason for their choice

Criterion	Reason for selection	Minimization (Min) or maximization (Max) criterion
Expenditure on teacher salaries per pupil (2017)	To measure the efficiency of upper secondary schools inputs characteristically include, inter alia, educational expenditure. Teachers' salaries represent the largest single cost in education.	Min
Pupils' interest in the school (development of the number of incoming pupils) (2013-2017)	This criterion represents pupils' interest in attending a particular school. Higher number of incoming pupils will ensure higher efficiency as the capacity of schools will be better utilized.	Max

Pupils' interest in the field (development of the number of applications for the fields of study) (2013-2017)	This criterion represents pupils' interest in attending a particular field. The growth of newly incoming pupils to individual fields can be deduced from the overall development of the character of upper secondary education in the region.	Max
The average success rate in the final exams (2013-2017)	School makes effective higher achievement of pupils level (Murat, Kazan and Coskun, 2015). Almost every study that measures school efficiency uses pupil performance as an output indicator.	Max
Conformity of the completed education (field) and the area of employment of graduates (2016)	We focused on full compliance, which means that graduates work after school in the field (in a group of fields) for which they were prepared directly in the school (NÚV, 2017). The higher value of full compliance indicates the effective use of acquired qualifications in real labour market conditions, conversely high values of gross dissension (low full compliance values) point to some discrepancy between graduate preparation and real labour market needs.	Max
Development of job vacancies by branches (2014-2018)	Pupil subsequent labour market performance is often used as an output in studies that measure efficiency. Larger number of vacancies expresses the greater demand of employers for employees and hence greater chances of job opportunities for graduates.	Max
The probability of automating fields in the future (by 2025)	Czech National Institute for Education calculated the probability of automation threats for individual qualifying groups (for fields of upper secondary schools and also for fields of higher schools) by 2025 in its study (NÚV, 2015). We used these values for individual upper secondary school fields and created the indicator the probability of automating fields in the future. The lower this indicator, the greater the probability of graduate needs in the field and better use of graduates in the labour market in the future.	Min

Source: own processing

2 Material and Methods

This study covers all vocational secondary schools established by the Pardubice Region. We have included 34 of these schools with the exception of the conservatory of Pardubice because it has a different status and characteristics. The evaluation period is 2013-2017. All schools in the sample were divided into schools with graduation exam fields (Table 3) and schools with apprenticeships fields (Table 4) for analysis due to different characteristics (different criteria values) between these types of schools. Data on schools and their criteria (described in Table 1) were obtained from the following sources: school annual reports, annual reports on the state and development of the education system in the Pardubice Region, internal materials of the Pardubice Region Department for Education, studies published by the Czech National Institute for Education and data from the Regional Labour Office.

A huge literature about the educational efficiency exists (Davutyan, Demir and Polat, 2010). For measuring efficiency in education some studies use traditional regression (Deutsch, Dumas and Silber, 2013), or a multilevel regression analysis (Fekjaer and Birkelund, 2007). MCDM is also widely used method (Ho, Dey and Higson, 2006; Murat, Kazan and Coskun, 2015). However, Data envelopment analysis (DEA) is the most commonly used (Alexander et al, 2010; Nauzeer, Jaunky and Ramesh, 2018). DEA is the quantitative approach to carry out the performance measurement. This method adopts the linear programming to measure the relative efficiency of homogenous operating units, for instance, banks, hospitals, schools, and so on. The goal is to find out the best practitioner as a model for the others to benchmark, identify inefficiency, and improve their performance.

Kolios et al (2016) state that in contrast to DEA, which aims at an ex-post evaluation of similar units for the purpose of monitoring and control, the objective of MCDM is the ex-ante assessment of a few individual options by explicitly considering the subjective preferences of a decision maker for the purpose of decision support, planning and choice. Unlike the DEA, which is just suitable for the performance measurement, the MCDM techniques are more practical and applicable. Besides, the techniques coincide with real-world situations because the decision problems normally consist of multiple criteria rather than a single objective. For these reasons, MCDM method for our analysis was preferred, specifically we used the Weighted Sum Method (WSM).

Multi-criteria decision making (MCDM) refers to making decision in the presence of multiple and often conflicting criteria. In the real world almost every important problem involves more than one objective, which may be related to economic, social and environmental considerations. When there is more than one objective,

and the objectives are non-commensurate, a compromise solution must now be selected on the basis of the decision maker's attitude to achievement of the various objectives.

MCDM is a procedure that combines the performance of decision alternatives across several, contradicting, qualitative and/or quantitative criteria and results in a compromise solution. A MCDM problem may not have a single solution that could optimize all objectives simultaneously. The generally accepted solution of a MCDM problem is said to be a Pareto solution (or non-dominated solution). A Pareto solution is the one for which any improvement in one objective can only takes place if at least one other objective worsens (Kolios et al, 2016). Such solutions are referred to as the best compromise. The final solution of a MCDM problem should be one of the compromise options that can best satisfy the decision-makers' preferences. There are several approaches to obtaining such solutions. Based on the ways of extracting the decision maker's preference information and using it in decision analysis processes, the MCDM methods can be divided into three main categories (Marler and Arora, 2004):

First, methods with a priori articulation of preferences which allow the designer to specify preferences according to relative importance of different objectives include, for example, the weighted sum method we used. Second, there are methods for a posteriori articulation of preferences when decision maker express an explicit approximation from a range of solutions and thirdly, there are methods with no articulation of preferences.

Weights are used to establish preferential relationships between options in dependence on decision-making objectives. In general, the more important the criterion, the higher is weight of this criterion. As a rule, weights of criteria are standardized so that their sum is equal to one. The criteria weights determination methods could be classified into two main groups, namely objective approaches and subjective approaches. In the objective approaches, criteria weights are derived from information contained in each criterion through mathematical models (without decision makers intervention). In subjective approaches, criteria weights are derived form decision makers subjective judgment (Aldian and Taylor, 2005).

The problems with MCDM methods are generally a selection problem whereby one attempts to select the best or optimal alternative from a pre-specified but finite set of alternative. Selecting a particular method depends on the characteristics of a problem, and is also partly based on the decision maker's preference. According to Kolios et al (2016) the weighted sum model/method (WSM) is probably the most commonly used approach, especially in single dimensional problems. This method is suitable for our analysis. Using the WSM to solve a problem entails selecting scalar weights w_i and optimizing the following composite objective function (Aldian and Taylor, 2005):

$$S_i = \sum_{j=1}^{n} c_{ij} w_j \tag{1}$$

or

$$\begin{bmatrix} S_1 \\ S_2 \\ \vdots \\ S_m \end{bmatrix} = \begin{bmatrix} c_{11} & c_{12} & \cdots & c_n \\ c_{21} & c_{22} & \cdots & c_{2n} \\ \cdots & \cdots & \cdots & \cdots \\ c_{m1} & c_{m2} & \cdots & c_{mn} \end{bmatrix} \times \begin{bmatrix} w_1 \\ w_2 \\ \vdots \\ w_n \end{bmatrix} \tag{2}$$

where S_i is appraisal score for alternative i, c_{ij} is the score of alternative i with respect to criteria j and w_j is the weight of criteria j. It implies that the higher the value of S_i the higher is the rank.

Using this method, we work with the weights of the individual criteria, which are either given or estimated appropriately. In our case, the weights of the individual criteria were set by experts. We have set weights v = (v_1, v_2…, v_7) for 7 maximization criteria. Minimization criteria we transferred to the maximization criteria. The weighted sum method then maximizes the weighted sum (Formula number 1 or 2).

We have gained an opinion on weighting from 3 experts (director of the vocational secondary school - Expert 1, the expert in education - Expert 2 and the representative of the Pardubice regional self-government in education department - Expert 3). To determine the weights of the criteria we used the rank-based method which is applied primarily in cases where more than one decision maker evaluates these weights (Sureeyatanapas, 2016).

Every expert has ranked the criteria from the most important to the least important. The most important criterion was assigned 7 points (7 is the number of criteria) and each less important criterion 7-1 points. The least important criterion got only 1 point. The weight of each criterion is determined by the sum of the points it has received from each of the experts, and by dividing those points by the total number of points that the experts have divided among all the criteria. The criterion weighting relationship looks like this (Šubrt, 2011):

$$w_j = \frac{b_j}{\sum_{j=1}^{n} b_j} \tag{3}$$

where w is the weight of the criterion, n represents the number of criteria, b expresses the number of the criterion evaluated and j = 1, 2,…, n.

Table 2 presents the criteria used, their ranking determined by the expert opinions, and the calculated weights by the rank-based method.

Table 2 – The ranking of the criteria set by experts and the calculated weights by the rank-based method

Criterion	Expert 1	Expert 2	Expert 3	Weights
Expenditure on teacher salaries per pupil (2017)	4	5	6	0.107
Pupils' interest in the school (development of the number of incoming pupils) (2013-2017)	5	3	3	0.155
Pupils' interest in the field (development of the number of applications for the fields of study) (2013-2017)	6	4	4	0.119
The average success rate in the final exams (2013-2017)	7	1	1	0.179
Conformity of the completed education (field) and the area of employment of graduates (2016)	2	2	5	0.179
Development of job vacancies by branches (2014-2018)	1	7	2	0.167
The probability of automating fields in the future (by 2025)	3	6	7	0.095

Source: own calculation based on expert opinions

Experts' opinions on the importance of criteria weights vary. They attribute the highest weight on average to the average success rate in the final exams and to conformity of the completed education (field) and the area of employment of graduates. The greatest difference in importance is attributed to the average success rate in the final exams where the Expert 2 and Expert 3 evaluate this criterion as the most important and, on the other hand, this criterion is the least important for Expert 1. Criterion of the probability of automating fields in the future has on average received the lowest weight, according to experts, because of the uncertainty of prediction.

3 Results and Discussion

After obtaining and calculating the weights for each criterion, we calculated the weighted sum value individually for all vocational secondary schools in our sample and then we determined their order. The results of our analysis are shown in Table 3 and Table 4.

Table 3 – The final ranking of vocational secondary schools with graduation exam fields by WSM

Ranking	Vocational secondary school (fields with graduation exams)	WSM value
1	Secondary medical school, Svitavy	0.669
2	Secondary medical school, Pardubice	0.630
3	Higher vocational school and Secondary medical and social school, Ústi nad Orlicí	0.629
4	Higher vocational school and Secondary technical school, Česká Třebová	0.620
5	Secondary school of electrical engineering and Higher vocational school, Pardubice	0.592
6	Secondary medical and social school, Chrudim	0.552
7	Higher vocational school and Secondary school of civil engineering, Vysoké Mýto	0.551
8	Business academy, Chrudim	0.550
9	Secondary automotive school, Holice	0.543
10	Secondary automotive school, Ústí nad Orlicí	0.542
11	Industrial secondary school, Letohrad	0.528
12	Business academy and language school with the right of state language exam, Pardubice	0.510
13	Higher vocational school of education and teacher´s training school, Litomyšl	0.510
14	Secondary industrial school, Chrudim	0.498
15	High school of chemistry, Pardubice	0.471
16	Business academy and Secondary school of tourism, Choceň	0.471
17	Secondary school of agriculture and veterinary, Lanškroun	0.466
18	Integrated secondary technical school, Vysoké Mýto	0.429
19	Secondary school of civil engineering, Pardubice	0.427
20	Secondary vocational school of trade and services, Chrudim	0.409
21	Secondary vocational school, Svitavy	0.393
22	Secondary industrial school of food, Pardubice	0.393
23	High school of horticulture and technical, Litomyšl	0.392
24	Integrated secondary technical school, Moravská Třebová	0.373
25	Secondary technical school of mechanical engineering, Třemošnice	0.366
26	Secondary School of business, crafts and services, Žamberk	0.359
27	Secondary school of applied arts, Ústí nad Orlicí	0.356
28	Secondary technical school, Králíky	0.274
29	Secondary apprentice college for the gas industry and plumbing, Pardubice	0.261
30	Secondary technical school and Secondary vocational school, Lanškroun	0.234
31	Secondary school of agriculture and Higher vocational school, Chrudim	0.230
32	Secondary technical school and Secondary vocational school, Polička	0.220
33	Secondary agricultural school, Chvaletice	0.212

Source: own calculation according to Aldian and Taylor (2005) described weighted sum method

In the case of vocational secondary schools with graduation exams, medical schools are most effective according to the analysis. There was a growing interest in the study of this field by pupils during the monitored period. Conformity of the completed education (medical field) and the area of employment of graduates is high, and there has been a relatively large number of vacancies, especially for nurses. Currently, there are no satisfied nurses in the Czech Republic especially due to wage conditions. Medical fields are threatened by the low level of automation in the future. According to Frey and Osborne (2017), it is a profession that, within the framework of

social, organizational, physical, creative or intellectual requirements, it will not be possible to simply digitize or automate.

Technical schools, which are high number in the Pardubice Region, are characterized by high variability in terms of efficiency. A common feature for these schools is the long-lasting high demand of employers for technical, especially engineering, electrical engineering, chemical graduates, or graduates in transport and construction industry.

According to the analysis, agricultural schools ranked low. Interest in the study of this field by pupils is declining during the monitored period and pupils achieve low results at school-leaving examinations. Graduates often do not work in the field of study, mainly due to low demand for agricultural workers from employers in Pardubice Region. This low demand also results in low number of vacancies in agriculture.

Table 4 – The final ranking of vocational secondary schools with apprenticeships fields by WSM

Ranking	Vocational secondary school (apprenticeships fields)	WSM value
1	Integrated secondary technical school, Vysoké Mýto	0.670
2	Secondary industrial school, Chrudim	0.638
3	Secondary vocational school, Svitavy	0.616
4	Secondary technical school of mechanical engineering, Třemošnice	0.600
5	Industrial secondary school, Letohrad	0.596
6	Secondary school of agriculture and Higher vocational school, Chrudim	0.521
7	Secondary technical school, Králíky	0.503
8	Secondary school of civil engineering, Pardubice	0.501
9	Secondary technical school and Secondary vocational school, Lanškroun	0.500
10	Secondary school of horse breeding and horse riding, Kladruby nad Labem	0.481
11	Secondary automotive school, Ústí nad Orlicí	0.478
12	Secondary medical school, Pardubice	0.472
13	Higher vocational school and Secondary technical school, Česká Třebová	0.455
14	Secondary automotive school, Holice	0.452
15	Secondary agricultural school, Chvaletice	0.450
16	Secondary school of electrical engineering and Higher vocational school, Pardubice	0.437
17	Secondary School of business, crafts and services, Žamberk	0.420
18	Higher vocational school and Secondary school of civil engineering, Vysoké Mýto	0.412
19	Integrated secondary technical school, Moravská Třebová	0.399
20	Secondary industrial school of food, Pardubice	0.387
21	Secondary apprentice college for the gas industry and plumbing, Pardubice	0.384
22	Secondary vocational school of trade and services, Chrudim	0.372
23	Business academy and Secondary school of tourism, Choceň	0.356
24	Secondary technical school and Secondary vocational school, Polička	0.346
25	High school of horticulture and technical, Litomyšl	0.335
26	High school of chemistry, Pardubice	0.328
27	Secondary school of applied arts, Ústí nad Orlicí	0.301

Source: own calculation according to Aldian and Taylor (2005) described weighted sum method

In terms of apprenticeships, the vast majority of schools offer technical fields. This is related to the nature of the economy in the Pardubice Region, which is industrial.

Compared to schools with graduation exams, apprenticeships of agriculture fields achieve a higher degree of efficiency. There is an increase in the number of incoming pupils in these schools and pupils achieve good results in final examinations. However, agricultural industries face a high degree of automation in the future and the demand for agricultural graduates from employers is low (similarly to graduates with graduation exams).

Gastronomic and food fields (Secondary School of business, crafts and services, Žamberk; Secondary industrial school of food, Pardubice; Secondary vocational school of trade and services, Chrudim; or Secondary technical school and Secondary vocational school, Polička) - fields with graduation exams as well as apprenticeships fields - are characterized by low efficiency. The labour market is already saturated of these workers, it means that there are few vacancies and low conformity of the completed education (field) and the area of employment of graduates. According to Katrňák (2004), pupils of gastronomic and food fields have a low motivation to complete their studies (they do not enjoy their studies) and after school they often work in a different field. These fields have also higher risk of automation in the future.

In recent years, the number of upper secondary school pupils has been decreasing due to demographic trends and some fields show a significant decrease in the interest of pupils in the Pardubice Region. These issues have resulted in unused school capacities. The central government and regional authority strive to increase the efficiency of vocational secondary schools by optimization of their network (especially in the form of school mergers). The largest wave of merging came in 2011, when utilization of capacities of vocational secondary schools was less than 60 % in the Pardubice Region. This wave of merging covered almost all regions in the Czech Republic that face the same issues. (MŠMT ČR, 2013).

Despite the merger, the efficiency of vocational secondary schools is still low. Currently (in 2017) the average capacity utilization of all vocational secondary schools in the Pardubice Region is 64.88 %. Demographic development shows that in the next ten years we can expect a modest increase in the number of upper secondary school pupils and therefore an improvement in capacity utilization. However, at the beginning of the 2030s this age group should fall again (ČSÚ, 2014).

4 Conclusion

In this paper we evaluated the vocational secondary schools established by the Pardubice Region with respect to criteria describing efficiency - expenditure on teacher salaries per pupil, pupils' interest in the school (development of the number of incoming pupils), pupils' interest in the field (development of the number of applications for the fields of study), the average success rate in the final exams, conformity of the completed education (field) and the area of employment of graduates, development of job vacancies by branches, and the probability of automating fields in the future. We used one of the multi-criteria decision making methods (MCDM), specifically the Weighted Sum Method (WSM). Based on the results of this method we have ranked vocational secondary schools from the most successful = most effective to the least effective. Our analysis suggests that supported fields should be medical, technical and vice versa, fields that currently show low efficiency are agricultural or gastronomic fields. Efficiency of schools providing technical fields, that are large number in the Pardubice Region, is diverse. Efficiency varies from school to school, therefore schools need to be assessed individually.

Our results might be useful as the starting point of more effective allocation of resources and subsidies and it can also be an inspiration for designing an optimal network of vocational secondary schools in the Pardubice Region. The basic principle of setting this network is to maintain desirable spectrum of upper secondary school fields, which will respond to the demand of candidates for upper secondary education and the demand for skilled workers in the labour market. This principle also corresponds to the principle of the Regional Authority of the Pardubice Region stated in the latest annual report. The Czech Education Act states that in providing education and school services, especially in setting up and abolishing schools, the municipality and the region particularly take care of the coherence of the development of education and school services with the interests of the citizens, with the needs of the labour market, with demographic development, and with the development of its territory.

However, merging upper secondary schools is often very difficult to implement. This is politically unpopular (see Berka, 2015) and it is also important to take geographic considerations into account. Merging schools is much more difficult in rural areas than in bigger towns or metropolitan areas. The merging/extinction of schools in rural areas would also worsen the provision of public education services, where there is often only one upper secondary school. It is also important to maintain schools that are unique in nature within the country.

In our paper we focused especially on pupils' interest in the school and in the field (when higher number of incoming pupils will ensure higher efficiency as the capacity of schools will be better utilized) and the needs of the labour market. Further research in the area of optimization of vocational secondary school network in the Pardubice Region should also include detailed analysis of demographic development (population development of age group 15-19), the territory in the Pardubice Region, as well as analysis of the possibilities for cooperation

between vocational secondary schools and companies, and sectoral structure of companies and structure of secondary vocational education branches.

Cooperation between companies and vocational secondary schools appears to be an important factor in increasing efficiency and vocational education development. The involvement of the social partners is also important in this cooperation. Social partners are professional organizations, chambers of commerce, employers' representatives, etc. These partners and regional authorities as founders of upper secondary schools should support fields that are perspective and also modify the curriculum according to the needs of the labour market.

Acknowledgements

This contribution was supported by the scientific research project No. SGS_2019_019, "Transparency and competitiveness of municipalities and regions in the context of developing the concept of smart cities and regions".

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