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School Networks Optimization under the Social Value Based Approach: the Regional Context

Abstract

Introduction. Despite considerable attention to the spatial distribution of productive forces, we should notice that spatial distribution of schools in Ukraine remains unsolved, though it has a strategic importance due to its impact on human resources development and specialization. One of the tasks for effective social policy is spatial distribution of schools optimizing across a certain regional district. It means that some schools are to be closed while others left working. Therefore, finding out what schools are to be closed and whether it is the best optimization decision is a topical research contributing to the solution of the primary problem.

Purpose. The study is aimed at putting rationale behind the concept of a new method developed by the authors for assessment of social value assigned to schools within a certain district by different economic agents. The underlying problem is ongoing approach to the school networks optimization across regions performed by the Ukrainian Government. It influences human resources development as a part of productive forces.

Methodology. Analysis, synthesis, systematization, classification, logical chains and critical thinking were employed for introducing the concepts of «macro value», «micro value» and «social value» of schools. The social value of schools was formalized with an additive model. To find values of variables included into the model, a method of expert assessment was used. A method of ranks was taken for comparing expert assessments about social value of schools. To provide recommendations concerning particular schools to be closed, we employed a method of calculating the mean.

Results. Spatial distribution of schools across a certain district has a close relationship with the productive forces development and regulation of regional economic growth. Assessment of social value of schools returns opposite outcomes in terms of schools' ranks in comparison with the cost method currently employed by the Ukrainian Government. It has been proven by research of 19 secondary schools in Stakhanov city of Lugansk region (Ukraine). At the same time, any of these two methods does not give a balanced model for the school network development.

Conclusion. The concept of schools' social value represents their ability to meet the needs of consumers and is composed of micro value assigned by consumers of education services and macro value assigned by consumers of human resources. A conceptual Social Value Based Approach (SoVa) to the optimization of the school networks across districts demonstrates choice about closure of schools polar to the governmental cost approach since it operates with value for different groups of economic agents rather than costs.

Keywords: School Networks; Social Value; Regions and Districts; Regulation; Productive Forces

JEL Classification: R10; R12; R58

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Оптимізація мережі загальноосвітніх шкіл на основі оцінки їх соціальної цінності для розвитку економіки: регіональний контекст

Анотація. У статті запропоновано новий підхід до експертної оцінки соціальної цінності шкіл для економічного розвитку певного регіону. Методи аналізу, синтезу, систематизації та класифікації, побудови логічних ланцюжків і критичного мислення були застосовані для введення понять «макророзності», «мікроцінності» та «соціальної цінності» шкіл. Соціальна цінність шкіл представлена в адитивній моделі, що описує їх здатність задовольняти потреби споживачів і показує мікророззначення, яке ґрунтується на якості освітніх послуг, та макророззначення, що засвідчує якість людських ресурсів. Розроблений авторами концептуальний підхід, що спирається на показники соціальної цінності, а не на витрати з утримання шкіл, дає змогу оптимізувати мережу загальноосвітніх закладів у регіонах шляхом прийняття управлінських рішень про закриття або підтримку певних шкіл.

Ключові слова: загальноосвітні школи; соціальна цінність; регіони і округи; регулювання; продуктивні сили.

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Оптимизация сети общеобразовательных школ на основе оценки их социальной ценности для развития экономики: региональный контекст

Аннотация. В статье предложен новый подход к экспертной оценке социальной ценности школ для экономического развития региона. Методы анализа, синтеза, систематизации и классификации, построения логических цепочек и критического мышления были использованы для введения понятий «макроценности», «микроценности» и «социальной ценности» школ. Социальная ценность школ представлена в аддитивной модели, которая описывает их способность удовлетворять потребности потребителей и показывает микрорезультат, основанное на качестве образовательных услуг, и макрозначение, характеризующее качество человеческих ресурсов. Разработанный авторами концептуальный подход, опирающийся на показатели социальной ценности, а не на расходы по содержанию школ, позволяет оптимизировать сеть общеобразовательных школ в регионах путем принятия управленческих решений о закрытии или поддержке определенных школ.

Ключевые слова: общеобразовательные школы; социальная ценность; регионы и округа; регулирование; продуктивные силы.

1. Introduction

Today, Ukraine faces a challenge of the underdeveloped strategy for effective usage of national productive forces composed of nature resources, tangible and intangible assets and human resources. In detail, Ukraine has no strategy for human resources development, which should have served as a background for effective social policy. For example, households still pay a higher price for gas supply than companies do. People consume public services in the field of education and healthcare guaranteed by the government of extremely low quality. Besides, the average level of salaries remains to be inadmissibly low, while highly restricted social expenses incurred by the government are contemptuously called «expenses of consumption» rather than investment. In turn, the problem of human resources development should be divided into small tasks, among which a distinctive place is occupied by reforming middle-level schools. One of those tasks is getting spatial distribution of schools optimized across a certain district. It means that some schools are to be closed while others left working. Therefore, finding out what schools are to be closed and whether it is the best decision for the optimization is a topical research contributing to the solution of the primary problem.

2. Brief Literature Review

The spatial distribution of productive forces is viewed by scientists in accordance with two main frameworks. The first conceptual framework is the geographical theory of the spatial distribution of productive forces (J. Tyunen, W. Lundhardt, A. Weber, and A. Lesh). Scientists committed to it argue places where productive forces are to be located for achieving the best results. The second conceptual framework adds a dynamic variable to the geographical concept and provides information about whether productive forces location in certain places boosts economic cycles. The fundamental research related to this concept was performed by R. Barro and S.-i-M. Xavier (1992) [1]. They investigated the spatial distribution of productive forces in developed and underdeveloped countries. Later, the idea was checked by M. Bartkowska and A. Riedl (2012) for European regions [2]. However, the authors put rationale behind the usage of human capital indicator when making decisions about distribution of productive forces while other scientists provided confirmation of GDP and GDP per capita indicators as the most appropriate for productive forces location.

Also, to take an effective decision about productive forces distribution, managers should take into account research outcomes delivered by C. Leung and D. Quah (1996) who investigated efficiency of spatial layout of plants and

production facilities [3]. How to capitalize productive forces distribution and given conditional efficiency and changes in territorial production forces skeleton over time, revealed S. Rey and M. Janikas (2005) [4], A. Maza and J. Villaverde (2011) [5].

The latest research results concerning effective distribution of productive forces across Ukrainian regions cover strategies for attracting potential investors were achieved by N. Navrotska (2013) [6]. New methods of spatial economic growth were proposed by J. Komar (2013) [7], and improvement of innovation activity in regions – by V. Shevchuk (2010) [8].

3. Unsolved problems

Despite considerable attention to the spatial distribution of productive forces demonstrated by scientists, we should point out that spatial distribution of schools in Ukraine remains unsolved even though it has a strategic importance due to its impact on human resources development and explicit specificity. The school's output is a specific product difficult to be described quantitatively.

Earlier, we analyzed a cost approach to the optimization of the spatial distribution of schools located in certain districts, so that the government may reduce budget expenses for their maintenance [9]. The approach returned practically inappropri-

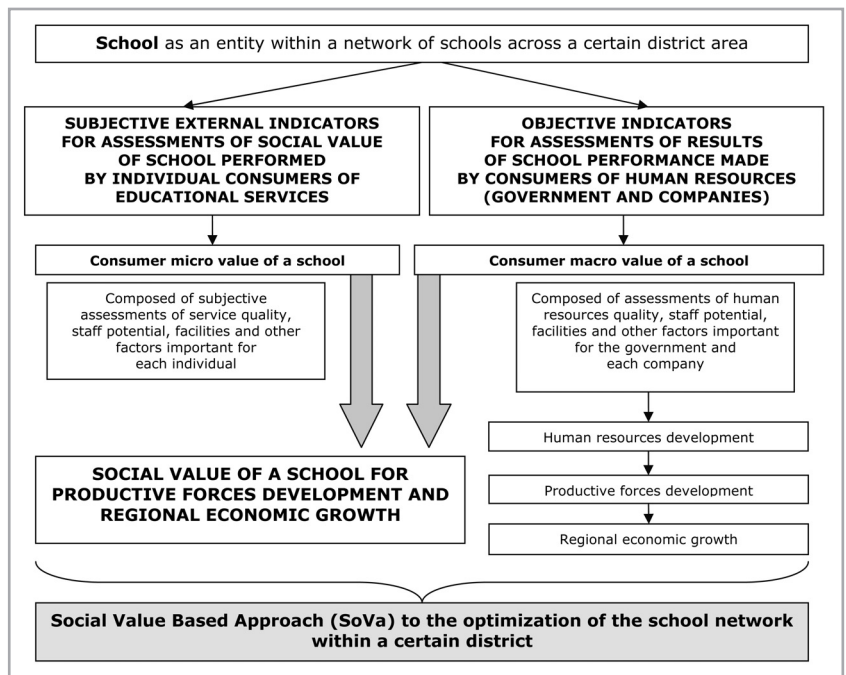


Figure: The Concept of Social Value Based Approach (SoVa) to the Optimization of the School Network within a Certain District

Source: Developed by the Authors

ate results, because the government should closed those schools which provide the best educational services according to experts' and parents' assessments and, therefore, are the most cost-intensive. Thus, the bold cost approach does not allow managers taking into account important indicators of educational services quality, which are factors of human resources development and impact regional economic growth as a part of productive forces.

4. Purpose

To substantiate the concept of a new method developed for assessment of social value assigned to schools within a certain district by different economic agents.

5. Results

Each school has its own social value for productive forces development and regional economic growth. Thus, this should be taken into account when making a decision about its closure (see Figure).

Social value of the school is referred as realized ability to meet consumer needs. In this case, one type of consumers is individuals and households customizing educational services, making subjective assessments about the school and putting all these together for perceiving consumer micro value. Another type of consumers covers the government and companies customizing knowledge and skills of individuals and assessing macro value of school. Thus, the concept of social value assigned to a school is consistent with the institutional theory declaring equality of interests of all economic agents. Social value of the school is represented with a sum of consumer micro and macro values.

The consumer micro value is the value of the school for an individual consuming a service of gaining knowledge, mastering skills and revealing other talents. So, consumer micro value of the school is composed of subjective assessments of quality of services, staff potential and educational facilities. We should not exclude individually important factors, which can be found out through marketing research. By extension, each component of the consumer micro value has its own weighing ratio dependent on individual's preferences.

The consumer macro value is the value of the school for government and companies consuming human resources. Therefore, consumer macro value is composed of objective assessments regarding quality of human resources, staff potential and facilities and other factors important for each economic agent. Each element of the consumer macro value also has its own weighing ratio which is dependent on governmental tasks or business needs.

Let us propose an Equation (1) for social value of a school, SV:

$$SV = MICV + MACV = \sum_{i=1}^N (QE_i \cdot \omega_{qei} + R_i \cdot \omega_{ri} + SF_i \cdot \omega_{sfi}) + \sum_{j=1}^M (HR_j \cdot \omega_{hrj} + R_j \cdot \omega_{rj} + SF_j \cdot \omega_{sff}), \quad (1)$$

$$\omega_{qei} + \omega_{ri} + \omega_{sfi} = 1; \quad \omega_{hrj} + \omega_{rj} + \omega_{sff} = 1$$

where MICV is consumer micro value of the school; is consumer macro value of a school; i, j are the order numbers of economic agents consuming education services and human resources and assessing social value of the school; N, M are total numbers of economic agents consuming education services and human resources and assessing social value of the school; QE_i, R_i, SF_i are values of service quality, resource potential and other individual factors important for consumers of educational services; $\omega_{qei}, \omega_{ri}, \omega_{sfi}$ are weighing ratios for value of service quality, resource potential and other individual factors important for consumers of education services; HR_j, R_j, SF_j are values of human resources trained by a school staff, resource potential and other individual factors for consumers of human resources; $\omega_{hrj}, \omega_{rj}, \omega_{sff}$ are weighing ratios for value of human resources trained by a school staff, resource potential and other individual factors for consumers of human resources.

The above introduced concept of school social value became a core for the development of Social Value Based

Approach (SoVa) for the optimization of the school network within a certain district. As opposed to the current cost approach, SoVa assesses a school according to indicators of consumer value for different groups of economic agents rather than amounts of budget expenses.

SoVa allows managers making decisions concerning all stages within the supply chain for education services. Our analysis of supply chain for education services subject to SoVa provided the following conclusions.

Firstly, the production process in school is specific since it has orientations for two types of consumers – students and further employer – and has two final products – education service and human resources. Therefore, social value of the school is a concept with double meaning.

Secondly, education service and human resource, as results of school performance, may be not identical due to the refraction effect. Thus, by providing highly qualitative education service, a school cannot guarantee that human resource will also be highly qualitative because education service is assessed by students and human resource is assessed by the government or companies; however, their understanding of quality may not be the same. In addition, due to the refraction effect input variables of education service are not equal to output variables of human resources. It is caused by psychological and physical features of studying individual, as well as factors of external environment.

SoVa was checked by us for the schools of Stakhanov city of Lugansk region (Ukraine) in 2014. To simplify the assignment, consumer micro value was excluded from the Equation (1). Fifteen experts invited to assess schools of Stakhanov city were divided into five groups. The first group was composed of representatives of the local government. The second group consisted of teachers working for colleges and universities. The third group comprised representatives of the local trade union in the field of education. The fourth group included employees of local kindergartens. The fifth group was composed of teachers representing art and sport schools.

Experts ranked schools governed by the local authority on education affairs in Stakhanov city by putting 1 to the highest rank and assigning 19 to the lowest (see Table). The number 19 is related to the total number of investigated schools. Each group of indicators, as well as each indicator within a group, was given equal weighing ratio. Concordance coefficient was found to be 0.93, confirming the high level of consistency among experts. Therefore, results obtained through the research are accurate and adequate. The mean for schools' ranks is 9.93. Almost half of schools located in Stakhanov city are assessed by experts negatively in terms of quality of education services and macro value.

Ranks of the schools shown in the Table fit to the actual demand for their education services in terms of students, studying at them.

By taking into account only social values of schools, the local authority on education affairs may close those schools having ranks above 10 and spread students left without a school among those having ranks below 10. Total capacity of left schools in Stakhanov city is 8470 students subject to the actual number of studying students of 6485. So, the closure of schools with low social value and consumer macro value will not lead to the lack of vacancies at left schools. However, in case of the demographic boom, the school network of Stakhanov city has 25% capacity reserves.

The example of Stakhanov city shows that SoVa approach, as well as cost approach, returns results able to cause an imbalance in the spatial distribution of schools, because distant areas appear to have a lack of social infrastructure and face low standards of living compared to the central areas. Herewith, SoVa requires an economic confirmation while the cost approach requires more consistency with social standards of living. Therefore, the problem of optimizing school network is required to be solved by means of other approaches.

Table: Schools of Stakhanov City of Lugansk Region Ranked According to the Social Value Based Approach

School	Groups of experts					School rank	Decision about closure
	No 1	No 2	No 3	No 4	No 5		
No 9	1.20	1.00	1.00	1.80	1.20	1.24	Schools not to be closed
No 7	2.00	2.80	2.20	2.60	3.40	2.60	
No 3	3.00	3.20	3.00	2.20	2.80	2.84	
No 15	3.80	4.80	3.80	3.40	4.60	4.08	
No 10	6.20	5.20	6.20	6.80	4.60	5.80	
No 28	6.20	6.20	6.20	6.00	6.20	6.16	
No 11	5.60	6.60	5.60	6.20	7.00	6.20	
No 29	8.60	8.20	8.80	9.60	8.60	8.76	
No 18	8.80	8.60	9.20	9.40	8.40	8.88	
No 26	9.80	10.60	9.80	10.60	10.40	10.24	
No 8	11.40	10.40	12.00	10.00	10.60	10.88	
No 32	12.20	11.80	11.40	11.00	11.80	11.64	
No 14	12.20	12.00	12.00	13.40	12.40	12.40	
No 13	14.20	14.20	14.60	13.80	13.60	14.08	
No 12	15.00	16.60	14.60	15.00	16.80	15.60	
No 25	15.80	15.80	15.60	15.40	16.20	15.76	
No 16	18.00	16.60	17.60	16.80	16.20	17.04	
No 2	17.80	17.40	18.00	18.00	17.40	17.72	
No 1	18.20	18.00	18.40	18.00	17.80	18.08	

Source: Developed by the Authors on the basis of empirical research

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6. Conclusions

As a result of undertaken research, we may reveal the following outcomes.

1. There is a problem of ineffective spatial distribution of schools in terms of high expenses incurred by the government for their maintenance.

2. The government should make a decision what schools to close in conditions when budget expenses are strongly reduced.

3. To put rationale behind the approach opposite to the cost approach, authors introduced the concept of school social value, which represents its ability to meet consumers' needs and is composed of micro value of education services and macro value of human resources.

4. The new Social Value Based Approach (SoVa) to the optimization of the school network within a certain district allows authorities assessing each school in the context of its micro and macro values.

5. SoVa approach tested for schools located in Stakhanov city of Lugansk region and showed imbalance in spatial distribution of schools across a certain area as well as cost approach did.

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