HUMAN CAPITAL FACTORS AND REMUNERATION: ANALYSIS OF RELATIONS, MODELLING OF INFLUENCE

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Abstract. This paper argues that basing on existing theoretical studies of human capital factors fuzzy logic method shall be applied in in identifying their impact upon the interest on human capital use (wages). The suggested approach allows determining the factors impossible to describe through quantitative indicators, i.e. gender, education level, experience. Unlike traditional approaches, such as ranked assessments or investment cost indicators in the formation of certain human capital components, the use of the proposed methodology for analysing the link between human capital factors and remuneration allows applying real characteristics of the human capital of employees. Appropriate assessment can be the basis of modelling and correction of relations in determining wages and suitable decision-making regarding the development and changes in the structure of the human capital of the company.

Keywords: human capital, education, skills, experience, wage, fuzzy logic method.

JEL classification: C38, J240, J310.

Introduction

The theory of human capital despite its relative novelty in scientific discourse is gaining increasing popularity which can be particularly visible through a large number of scientific publications on relevant topics. For instance, the "human capital" keyword search in a single scientific search engine (Google Scholar) gives more than 3.68 million results in English only. Considering the content of modern scientific research, the papers do become more practical and mostly move away from traditional models of investment feasibility assessment of human capital (hereinafter – HC). Nowadays human capital is not just an abstract set of employee's abilities. The approach, in which HC is analysed in terms of the allocation of its key elements, is certainly dominant. However, these elements are given a certain content

to be assessed, and it is not limited to the identification of HC with employment or other characteristics of workforce use, as it used to be typical, for example, for economic growth models (Solow 1957, Romer 1986). Nevertheless, current trends of economic relations' socialization require considering the impact of human capital components on the formation of interest for its use to a greater extend. By applying the capital theory methodology to the human capital analysis as one of its forms, one can equate wages or salaries with the interest on human capital. Thus, the authors have designed this study to identify the impact of human capital factors that determine the appropriate salary level for the use of the identified relationships in wages modelling depending on the characteristics of the available human capital.

1. Literature review

A continuous trend in the debate regarding the human capital factors, starting from the major fundamental scientific research in this field (Becker 1962, Mincer 1958, Schultz 1962) is to explore the possibilities of its development for its effective use. Given that the foremost way to ensure the emergence of new qualities or improvements of human capital are HC investments, the study of their impact, especially at the enterprise level, is always an urgent matter as entrepreneurs persistently want to optimize their costs.

The cost approach to the human capital assessment and respective return on investment has led numerous scholars, in particular (Zakharova and Kratt 2014, Unger et al. 2011), to support similar ideas. In general, Table 1 contains the most typical examples of recent studies evaluating HC and which can be used in the regulation of relations arising in various stages of HC reproduction.

Empirical work has become more sophisticated and its peculiarity includes testing methodological principles of capital theory and the theory of value. In particular, the use of "market value method" (Bechtel 2007) provides one of the most comparable assessments of the human and physical or financial capital. This approach, in addition to the objectives stated by the author opens up opportunities not only for acceptable HC value assessment: the continuation of its use leads to reducing the owners' conflicts of interest in the field of determining their rightful share of added value (as a percentage of the corresponding type of capital). The contemporary research is also remarkable for the application of modern mathematical tools to determine the connection of various macro- or microeconomic performance indicators and HC components: health (Jakubowska 2016); education, knowledge, skills, and other components of human intellectual capital (Čadil et al. 2014, Marvel and Lumpkin

Table 1. Contemporary approaches to assessment of human capital components and possibility of their use in human resource management

Author	Object of Study	Methods of Analysis	Components of Assessed Object	Possibilities (Fields) of Results' Use
Balcerzak 2016	Quality of Human Capital	Multiple-criteria analysis / taxonomic analysis	HC components according to formation and use stages; key ones: education, R&D, employment, productivity	Regulating human capital reproduction at macroeconomic level
Bechtel 2007	HC value	Market value method	Market factors of price formation	Alignment of employees' and employers' interests in determining the HC value
Čadil et al. 2014	HC impact on GDP and unemployment	Cluster and regression analysis	Education as a key element of HC	Improving the educational structure of HR in different sectors / clusters of economy
Jakubowska 2016	HC effectiveness depending on health limitation	Variance analysis	Health level (factor) and results: employment, income	Improving social policy, in particular in the field of employment of disabled people and people with health conditions (limitations)
Jeremic et al. 2012	HC (composite index)	Multivariate I-distance method / cluster and correlation analysis	HC indicators by groups: education, skills, science and technology	Detection of HC reserves by rank comparison with other countries
Hayton 2003	Interaction between HC management and strategies of HR management	Correlation analysis, sociological review	Strategic and financial HC management practices	HC management use for sustained competitive advantage
Marvel and Lumpkin 2007	HC impact on innovation outcomes	Correlation analysis, sociological review	General (education and experience) and specific HC factors (prior knowledge by types)	Managing knowledge that can influence innovation outcomes for technology entrepreneurs
Zakharova and Kratt 2014	Risk of human capital investment	Multi-criteria ranking	HC investments in the following areas: education, professional development, health care, mobility, motivation; Results: productivity, return on investment	Assessing the feasibility of human capital investment at microeconomic level
Unger et al. 2011	HC impact on entrepreneurial success: size, growth, profitability	Meta-analysis based on correlation	HC investments (education and experience) and outcome of HC investments (knowledge and skills)	Making decisions on HC investment

Source: own compilations

2007). The studies which aim to identify the level of human capital and the ability to attract reserves, such as (Balcerzak 2016, Jeremic et al. 2012), suggest methodological principles of integrated parameter "HC / Quality of Human Capital" estimation. This approach allows a researcher to get an idea of the benefits or shortcomings in human capital management strategy. However, contemporary management has moved even further and nowadays it demonstrates at different levels a need not to just improve the human capital, but to consider of the HC components and HR management for achieving the goals of the company (Hayton 2003) or a group of companies (Jagoda 2014), identifying mutual influence of factors and results of the human capital use: for instance, the relations of wages, labour productivity and unemployment (Nikulin 2015). Irrespective of how significant the links at a particular level of empirical research are, theoretical capacity of these hypotheses is beyond any doubt.

Based on intellectual capital importance for organization, some researchers proved the core role of its human component for company's value added growth: its significance was the largest comparing with the customer or structural/relational capital (Mačerinskienė and Survilaitė 2011, Tamošiūnienė and Survilaitė 2016). Similar research in the field of studying the links between intellectual capital and organizational performance illustrates that the higher performance depends on abilities of organization to optimise the human capital utilisation for the sake of optimising its structural capital (Urban and Joubert 2017). Investigating the knowledge role in profitability increase, it was also argued, that the level of knowledge intensity of companies, which is the feature of intangibility, has strong relations with their financial success (Martins and Lopes 2016). Human intellectual capital as well as gender has a sufficient influence on remuneration. It is well-known practice of different pay for the same work or so-called "gender pay gap" (Erosa et al. 2016, Grybaite 2006, Guimarães and Silva 2016). Such and some other factors (including the given in Table 1), may cause the significant inconsistencies in remuneration, and as a consequence, it may diminish capabilities of further human capital development.

Nevertheless, the issue of determining the level of pay that would allow objectively taking into account the differences in the ch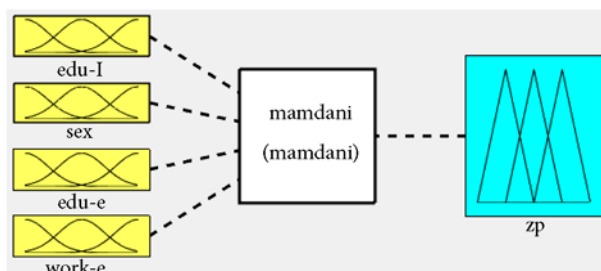aracteristics of human capital is still one of the most difficult tasks of modern HR management in the applied aspect. Its solution remains rather ad hoc, and largely depends on the analysis of existing relations between employers and employees, as well as on considering the influence of factors that are most important to both parties.

2. Methodology and research method

In order to find the factors that would be suitable as a basis for determining wages, the authors have used the methodological principles of the human capital theory. Considering the studies listed in Table 1, and numerous other developments in this field, it is clear that such HC characteristics as education and work experience are the most important factors which determine the value of interest for human capital use and can illustrate the differences between the expectations of employers regarding the efficiency of human capital. However, gender is also a significant factor in the inequality formation; therefore this option is also included as a part of independent variables.

As for the education, we would like to agree with the position of many scholars that it plays a key role in shaping the competitive advantages of the human capital owners in the labour market. Hence, this factor is taken into account within the framework of two partial parameters: the obtained level of professional education and relative indicator of education level of the employee, i.e. the tertiary education (years) ratio in total years of schooling, primary to tertiary, both sexes.

The ratio of real wages to the minimum wage in the country is the resulting indicator for the respective analysis and modelling. This indicator eliminates the influence of those human capital components which are equally accounted for all employees in determining the labour price in terms of the minimum wage. Consequently we do not consider the payment for simple unskilled labour which purpose is to restore only the physical component of human capital, and therefore we shall be able to describe the impact of the indicators that cause the greatest difference in wages more accurately.

Figure 1 presents the schematic model of the influence of the identified human capital factors on wages. The figure has got the following symbols: Zp is the ratio of real wages to the minimum wage in the country; Sex is the employee's sex; Edu-L is the education level (from vocational / tertiary education and training to Master's degree); Edu-e is the education indicator (the tertiary education (years) in total years of schooling, primary to tertiary, both sexes); Work-e is the work experience.

The use of this scheme implicates the analysis of different options for input parameters' combinations, some of which are not exposed to direct mathematical formalization (in our case those would be Sex and Edu-L). Hence, the most common statistical analysis methods, i.e. variation, correlation or other methods of factor analysis presented

Fig. 1. Graphical interpretation of the model assessing the impact of human capital factors on wages

for instance in Table 1, are unusable in addressing this issue. Therefore, we have chosen fuzzy logic to deal with the given imprecise problem. According to this problem solving technique the factors that have no clear formal limits may be set by additional linguistic and mathematical processing. For instance, the value of linguistic variable "Sex" can be set as follows: 1 – male; 2 – female.

The technical part of fuzzy logic application is fairly well-known. In our study we have used a standard procedure of data processing by means of Fuzzy Logic Toolbox™ software for Matlab.

The study uses existing trends and factors affecting wages in Ukrainian enterprises. The values of the input parameters are derived from the monitoring of the relevant human capital characteristics of the redundant workers according to the data of the Rivne Regional Employment Centre. We believe that these figures are more appropriate in this case than the data from the survey because they do not have inaccurate responses regarding the individual characteristics (number of years of tertiary education, work experience). Apart from that, we take into account such characteristics as monthly redundancies from four companies representing industry (glass factory and bread manufacturing), health resort treatment and rest and utilities (water supply). As of October, 2014, the total number of redundant employees is 78. The fuzzy logic method allows receiving the estimates with a high degree of reliability based on the study of a relatively small statistical data set; consequently the volume of the data selected for modelling is sufficient. The information on the human capital characteristics of redundant workers to some extent illustrates the accumulation of fictitious human capital. However, due to the fact that both employees with low and very high values of input parameters were the subject to redundancy, we can assume that wages are equally affected by selected human capital characteristics for all employees: both redundant, and those who continued their employment relationship with the companies.

The application suitability of the approach that we have used to identify the factors which influence the level of remuneration can be confirmed by comparing real and simulated value of the result indicator, as well as the value of the determination coefficient.

The main difference of the results from other studies of human capital factors is the ability to take into account the factors that correspond to the fundamental principles of the human capital theory and current trends in the labour market, but have no formal statistical expression. The researcher can arbitrarily change the list of factors depending on the purpose of the study, but the principle of their linguistic description and then assigning relevant numerical values enables solving the issue of the absence of many important factors which cannot be taken into account in the other analysis and forecasting methods.

3. Results

In order to include the human capital characteristics that we had set into the wage analysis and forecast model, we formed a corresponding set of independent variables (Sex, Edu-L, Edu-e, Work-e) with the corresponding numerical characteristics and determined the limits of the response variable (Zp) for making the model (Table 2).

Table 2. Formal parameter values in the model of wage formation at the level of enterprises

Notation	Parameters	Limits
Sex	Employee's sex	1 – male, 2 – female
Edu-L	Education level	1 – vocational education and training (VET), 2 – Honours (H) – three years of university study, 3 – Bachelor's or undergraduate degree, 4 – Master's degree
Edu-e	Education indicators (number of years completed)	[0,6; 0,85]*
Work-e	Work experience	[1,48; 30,75]*
Zp	The ratio of real wages to the minimum wage in the country	[1,29; 2,95]*

Source: own research
* – obtained by statistical processing of the initial data

According to the chosen approach to modelling all parameters are presented as a set of linguistic variables, namely sex, education, etc. Each linguistic variable consists of a set of terms (fuzzy sets described by membership function).

The linguistic variable "Education Level" includes such terms as L1 – vocational education and training (VET), L2 – Honours (H) – three years of university study, L3 – Bachelor's or undergraduate degree, L4 – Master's degree; the linguistic variable "Sex" has two basic terms, particularly M – male, and W – female. The information on the linguistic variables "Experience" and "Education" were formed on the basis of statistical data used in the study.

The terms of the linguistic variables "Education" and "Work Experience" can divide the indicator into parts, namely L – Low, A – Average, and H – High, that characterize the tertiary education (years) in total years of schooling, primary to tertiary, and work experience (years), respectively.

The output variable "Zp" can take the values in the range from 1 to 3, i.e. from the minimum wage to a 3 times higher one which is available in the sample. The ratio of the real wages to the minimum wage can be set as follows: L – Low, A – Average, and H – High.

For example, the Fig. 2 demonstrates the membership functions of fuzzy terms of the linguistic variable "Wage Rate" formed basing on the available statistical data.
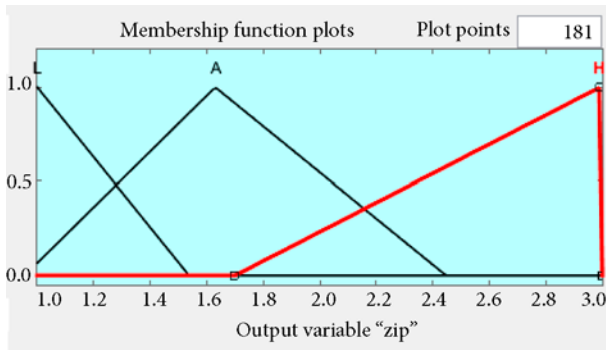
Fig. 2. Membership functions of the linguistic variable "Wage Rate"

Table 3. Rule-based system for wages modelling (fragment)

Linguistic Value of the Factor				Weight	Response Variable*
EDU-L	SEX	EDU-E	WORK-E	w	G
L3	M	A	L	w_1^L	L
L1	W	H	H	w_2^L	
L1	M	H	A	w_3^L	A
L2	M	A	H	w_4^L	

Source: own research
* the terms of the response variable are *L* – low; *A* – average

Table 4. Forecasting results based on the elaborated model

edu_l	sex	edu_e	work-e	zp	zp_m*
3	1	0.73	3.84	1.29	1.34
1	1	0.85	14.43	1.36	1.36
1	1	0.85	19.84	1.37	1.41
3	1	0.73	10.83	1.46	1.42
1	2	0.85	10.57	1.49	1.45
3	1	0.73	22.53	1.73	1.74
4	1	0.73	12.47	2.94	2.86

Source: own research
* zp_m – forecasted (modelled / estimated) wage rate indicator
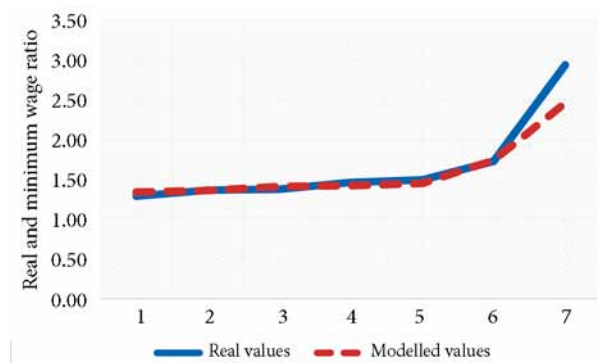

Fig. 3. Real and modelled values of wage rate
(for a set of input parameters listed in Table 4)

The modelling based on the relationships between input and output parameters can detect a rule base that transforms into the combined fuzzy equations which lead to the logical result mapping. Table 3 presents the fragment of the rule-based system that we received basing on the input parameters.

Therefore the functional mapping of the fuzzy set for the abovementioned extract is as follows:

$$\mu^L(edu-l, sex, edue-e, work-e) =$$
$$w_1^L\left[\mu^{L3}(edu-l)\cdot\mu^M(sex)\cdot\mu^A(edu-e)\cdot\mu^L(work-e)\right]\vee$$
$$w_2^L\left[\mu^{L1}(edu-l)\cdot\mu^W(sex)\cdot\mu^H(edu-e)\cdot\mu^H(work-e)\right],$$
$$\mu^A(edu-l, sex, edue-e, work-e) =$$
$$w_3^L\left[\mu^{L1}(edu-l)\cdot\mu^M(sex)\cdot\mu^H(edu-e)\cdot\mu^A(work-e)\right]\vee$$
$$w_4^L\left[\mu^{L2}(edu-l)\cdot\mu^M(sex)\cdot\mu^A(edu-e)\cdot\mu^H(work-e)\right],$$

$$(1)$$

where $\mu^L(edu-l, sex, edue-e, work-e)$ is a membership function that measures the degree to which an element belongs to fuzzy set, G is a variable with terms L, A, H, w_i^L is a weight for *i*-th rule with low salaries.

Throughout the experiment, we have tested the correspondence between the real values of the parameters from the initial sample and the calculated estimates: Table 4 shows the results of the sampling control for a random set of factors.

Figure 3 displays a graphical comparison of actual and simulated values of the real wages against the minimum wage for the values of the factor combinations listed in the table.

Our analysis allows us to conclude that wage growth directly depends on improving the quality characteristics of the human capital. At the same time, the modelled value of wages is almost identical to the actual estimates with minor differences in only one of the seven variants of factor combinations. However, the determination coefficient is 0.99 for the model in general, this means that the model accurately reflects the real value of the output indicator (the ratio of real wages to the minimum wage in the country) based on the input parameters.

As for the substantive results, the experiments showed that work experience and a Master's degree are the most influential factors in getting high wages for the given category of employees, all the other existing factors adjust the wages only partially. The findings are quite consistent with the idea of the most long-established human capital theory: education and training investment largely affects the growth of an individual' wage and are the determining competitiveness factors. Moreover, according to our analysis, it is not even the term of professional training for a particular specialty that largely affects the high wage rate (the employers value it much less than the work experience); it is the generally high educational level. It is obvious that for transition economies

at this stage of enterprise development it is important not to simply train a qualified specialist guided towards performing a limited range of specific professional tasks, it is vital to shape the values and skills of educational activities, including self-education which are formed in higher education system.

It goes without doubt that a set and importance of human capital components for use of which the employer is ready to pay in the form of high wages can vary depending on input conditions and simulation tasks. Nevertheless the search of the ratio of wages and efforts to develop human capital components in order to obtain it which will be most favourable to the parties requires constant testing instruments created by modern factor analysis. Today the fuzzy logic methods allows to deal with vague or imprecise problems, to assess the impact of all factors that match the logics of the existence of links with the result, regardless of the limitations on their mathematical content, and therefore ought to be more widely used in business practice. Wage forecasting basing on an individual set of components, first of all, restricts the use of non-transparent approaches to determine compensation. Second of all, in case of informing potential candidates or those already employed regarding the fact that existing compensation system takes into account the human capital formation factors while determining wages, this statement can be a powerful incentive to improve: this certainly applies only to those factors that can be influenced. This approach is likely to be used in company wage modelling, provided that the stakeholders consider the existing experience of influence recognition to be acceptable.

Acknowledgments

Conclusions

The development and practical application of the human capital theory has always been accompanied by the search of new factors that would allow identifying the impact of intellectual human capital components upon various aspects of economic performance more precisely. Knowledge, skills, education, professional development and investment in appropriate components are the most common human capital factors, and therefore studying them opens up new opportunities to manage balanced reproduction of the human capital of companies and countries. Nevertheless, the main idea of the vast majority of these developments is looking for a possibility to make a comprehensive assessment from the position of one of the stakeholders, i.e. government, employer or individual, who are generally regarded as investors and should be guided by rational motives (economic and / or social) in their decision-making.

The review of the existing scientific sources allows us to state that approaches to assessing human capital factors that could be the basis for the formation of transparent relations between employers and employees in determining the interest for human capital use which absolute measure is wages are still poorly developed. Any form of interaction regarding the wage rate shall take into account the factors that reflect the individual efforts concerning the accumulation of human capital which has some value from the employer's perspective. A set of factors which shall be taken into account and the method of analysis can vary extensively depending on the goals, values and priorities of the interacting parties. In our study, we suggest one possible option for modelling remuneration for the human capital use which also reveals the effects of socio-economic factors. Its use is based on considering the impact of the factors significant for the analysis subject without any restriction on their numerical expression. Our belief is that, on the evidence of this review, this approach allows implementing common interests basing on the increase of motivation to improve human capital characteristics which are obviously the most important ones at this stage of employment relations.

References

Balcerzak AP (2016) Multiple-criteria evaluation of quality of human capital in the European Union Countries. Economics & Sociology 9 (2): 11–26.

Bechtel R (2007) Calculating human capital: the market based valuation of the human resource. German Journal of Human Resource Management: Zeitschrift für Personalforschung 21 (3): 206–231. https://doi.org/10.1177/239700220702100302

Becker GS (1962) Investment in human capital: a theoretical analysis. The journal of political economy 70 (5, Part 2): 9–49. https://doi.org/10.1086/258724

Čadil J, Petkovová L, Blatná D (2014) Human capital, economic structure and growth. Procedia Economics and Finance 12: 85–92. https://doi.org/10.1016/S2212-5671(14)00323-2

Erosa A, Fuster L, Restuccia D (2016) A quantitative theory of the gender gap in wages. European Economic Review 85: 165–187. https://doi.org/10.1016/j.euroecorev.2015.12.014

Grybaite V (2006) Analysis of theoretical approaches to gender pay gap. Journal of business economics and management 7 (2): 85–91.

Guimarães CRFF, Silva JR (2016) Pay gap by gender in the tourism industry of Brazil. Tourism Management 52: 440–450. https://doi.org/10.1016/j.tourman.2015.07.003

Hayton JC (2003) Strategic human capital management in SMEs: an empirical study of entrepreneurial performance. Human resource management 42 (4): 375–391. https://doi.org/10.1002/hrm.10096

Jagoda A (2014) The Architecture of HR Function in Capital Groups – the Report of Empirical Research. Economics & Sociology 7 (1): 61–71. https://doi.org/10.14254/2071-789X.2014/7-1/6

Jakubowska A (2016). Health and limitations in health as the determinant of human capital effectiveness: perspective of the EU Member States. Journal of International Studies 9 (1): 240–251.

Jeremic V, Slovic D, Radojicic, Z (2012). Measuring human capital: a statistical approach. Actual Problems of Economics (5): 359–363.

Mačerinskienė I, Survilaitė S (2011) Company's value added and its intellectual capital coherence. Business: Theory and Practice/Verslas: Teorija ir Praktika 12 (2): 183–192. https://doi.org/10.3846/btp.2011.19

Martins MM, Lopes IT (2016) Intellectual capital and profitability: a firm value approach in the European companies. Verslas: teorija ir praktika 17 (3): 234–242.

Marvel MR, Lumpkin GT (2007) Technology entrepreneurs' human capital and its effects on innovation radicalness. Entrepreneurship Theory and Practice 31 (6): 807–828. https://doi.org/10.1111/j.1540-6520.2007.00209.x

Mincer J (1958) Investment in human capital and personal income distribution. The journal of political economy 66 (4): 281–302. https://doi.org/10.1086/258055

Nikulin D (2015) Relationship between wages, labour productivity and unemployment rate in new EU member countries. Journal of International Studies 8 (1): 31–40. https://doi.org/10.14254/2071-8330.2015/8-1/3

Romer PM (1986) Increasing returns and long-run growth. The Journal of Political Economy 94 (5): 1002–1037. https://doi.org/10.1086/261420

Schultz TW (1962) Investment in human capital in poor countries. The American economic review 51 (1): 1–17.

Solow RM (1957) Technical Change and the aggregate production function. Review of Economics and Statistics 39 (3): 312–320. https://doi.org/10.2307/1926047

Tamošiūnienė R, Survilaitė S (2016) Assessment of intellectual capital in joint-stock companies. Verslas: teorija ir praktika 17 (1): 56–64.

Unger JM, Rauch A, Frese M, Rosenbusch N (2011) Human capital and entrepreneurial success: a meta-analytical review. Journal of Business Venturing 26 (3): 341–358. https://doi.org/10.1016/j.jbusvent.2009.09.004

Urban B, Joubert GCDS (2017) Multidimensional and comparative study on intellectual capital and organisational performance. Journal of Business Economics and Management 18 (1): 84–99. https://doi.org/10.3846/16111699.2016.1255990

Zakharova O, Kratt O (2014) Economic study and risk estime of the investment in the human capital. Economics & Sociology 7 (2): 94–108. https://doi.org/10.14254/2071-789X.2014/7-2/8

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