



ARTICLE



<https://doi.org/10.1057/s41599-024-03946-x>

OPEN

Implementation of the human capital management concept: an empirical study of small trading company

Human capital is represented by people who are carriers of knowledge, ideas and experience that contribute to increasing the performance and competitiveness of the company and the entire society. Human capital management helps companies achieve business goals through efficiency, which includes the effective use of human capital and the effectiveness of investment in it. The article aims to explain the essence of human capital management, offers new metrics for measuring the effectiveness of human capital, and points out a possible approach to implementing human capital management in a specific small trading company. We used the observation method in obtaining data about the trading company, content analysis in the examination of scientific articles and internal documents of the company, synthesis, descriptive statistics, and mathematical methods in the design of metrics for measuring the value of human capital through Excel statistical software, and deduction in the design of generally applicable rules for all types of companies. IBM SPSS software was used for the statistical evaluation of the questionnaire survey. We obtained the basis for making the article through a questionnaire survey, which was carried out in 350 Slovak trading companies. Using a survey, we found that up to 89% of companies do not have a human capital management concept in place and do not use and do not know metrics to measure human capital effectiveness. It is while companies are aware of the impact of investments in human capital on the overall performance and the size of the company's profit. Based on it, we created metrics to measure the human capital's value. Thanks to quantitative analysis, we identified KPIs for small business company—sales, profit. We found that external factors also affect the value of human capital. In the analysed company, the improvement of the working environment helped to increase the value of human capital, which also led to higher customer satisfaction. The article fills a gap in the scientific literature because it deals with the issue of implementing the human capital management concept and metrics for measuring the human capital's value in the company. The theoretical and practical contribution of our contribution also lies in the use of common accounting documents in the quantification of the value of human capital. Companies can be inspired by the article because it provides an overview of the human capital management implementation in a small company, and designed metrics to measure the value of human capital.

A full list of authors and their affiliations appears at the end of the paper.

Introduction

The most important part of intangible resources is human capital (HC) (Sveiby, 1998; Koziol, 2018; Lubacha, 2023), i.e., employees' knowledge, skills, and knowledge to do the things that ultimately are responsible for the company's success. A company's performance, competitiveness, sustainability, and value depend on several factors (Lee et al. 2023; Laporsek et al. 2021; Ahmadí et al. 2021; Ionescu et al. 2020; Chalastra et al. 2019). However, the level of performance, development, competitiveness, and achievement of set goals of individual companies and entire economies is increasingly dependent on the knowledge and skills of employees and citizens (Mubarik et al. 2020; Perera and Thrikawala, 2012; Timothy, 2022; Safrankova and Sikyr, 2018). HC also increases the efficiency of the use of physical capital and contributes to the faster dissemination of technological progress with a high level of added value and innovation (Marimuthu et al. 2009; Adomako et al. 2022; De la Cruz Prego, 2021; Oyinlola et al. 2021). Currently, the field of human capital management (HCM) is influenced by Industry 4.0 and its elements, the implementation of which in the company can increase the productivity and efficiency of processes in the field of HCM. Also, because of these technologies, it will be necessary to increase the qualifications of employees through various training courses (Cameron et al. 2024). As technology is constantly changing and developing, lifelong learning needs to be emphasized. Especially in countries such as China, the importance of the so-called company's universities, which ensure that the employees of the given company are constantly educated (Han et al. 2024).

The importance of this asset is emphasized by several authors for individual types of companies such as trading companies (Dusek, 2021; Kotkova and Hromada, 2021; Pirogova et al. 2020; Pavlova and Khavrova, 2020; Enström, 2020; Zainon et al. 2020; Shen, 2020; Yang, 2020; Hassan et al. 2015), manufacturing companies (Yao-Ping Peng et al. 2024; Ogbeyemi et al. 2020; Guo and Chen, 2023; Lusena-Ezera, Liduma, 2018), or service companies (Vila et al. 2023; Ni et al. 2021; Monroy and Suárez, 2018). All authors confirm that HC is for different types of companies because it affects the success of any processes, be it personnel, financial, or production, as well as motivation processes, introduction of digital technologies, quality improvement, value building, work safety, or the company's sustainability process.

When implementing the HCM concept in the company, it is necessary to carry out thorough analyses of all parts of the company. This is so that critical processes and bottlenecks can be identified. In the same way, thanks to the analyses, key performance indicators (KPIs) will also be determined, which will always move the company forward. It is possible to include among such KPIs sales volume, revenue, profit, costs, customer satisfaction, etc. KPI can be considered in the company as a tool for measuring the efficiency of various processes over time. This method can be used to evaluate the performance of the company, but also to evaluate specific processes. One part of the KPI focuses on economic data (revenues, costs, operating cash flow, profit, etc.), and the other focuses on processes and departments (marketing, HR, IT, production, sales, etc.) (Klučka et al. 2022; Mehrifar et al. 2023; Gruenbichler et al. 2021).

Although economists have addressed the topic of HC, Becker (1993) is the author of a comprehensive theory of HC. He defines him as the sum of an individual's innate talents and abilities and the skills he acquires through upbringing and education. Based on his findings, several authors build on the term, supplementing the term with their own findings and knowledge. HC is considered part of a company's intellectual capital and market value (Edvinsson and Malone, 1997; Davenport and Prusak, 2000; Armstrong, 2007; Pitra, 2008; Zane, 2022; Wirasedana et al. 2024). Many factors influence the degree of application of HC in

company practice. These are, for example, motivation (Kampf et al. 2017; Afriyie et al. 2022) remuneration and growth system, corporate culture, talent care (Oladimeji et al. 2023), credibility (Tokarcikova, et al. 2016) quality of management by managers, use of technology, etc. (Lizbetinova et al. 2020a; Kohnova et al. 2020; Blstaková et al. 2020; Lorincova et al. 2018; Chodasova et al. 2016; Lorincova et al. 2016 Botella-Carrubiet et al. 2021).

Professional scientific literature is only partially devoted to the issue of the HCM concept, and the metrics intended to quantify HC in the company. The literature mentions the importance of HC, as well as its impact on companies operating in various industries. The problem is the absence of articles devoted to the very implementation of the HCM concept in the conditions of a real company, as well as the proposal of metrics for measuring the value of HC.

Therefore, the article aims to explain the essence of HCM, offers new metrics for measuring the effectiveness of HC, and wants to point out a possible approach to implementing HCM in a specific small trading company.

The theoretical contribution of the article is a detailed review of the issue of the implementation of the HCM concept and metrics for quantifying the value of HC, which is currently being increasingly emphasized. This is because HC is a means that enables companies to achieve a competitive advantage and increase their efficiency. However, to manage and develop HC through investments in education, health or working conditions, the company must implement the HCM concept. The essence of this concept is the implementation of activities that are supposed to ensure the greatest wealth for the company—people with their knowledge, skills, and experience—to understand the value of HC for the company.

Other benefits of our contribution include the implementation of HC value quantification through measurable indicators. The first of them is the human capital cost factor (HCCF), which, according to Veselinovic et al. (2021), quantifies HC through total costs (labour costs, benefit costs, absenteeism costs, turnover costs). Another is human capital value-added (HCVA), which makes it possible to quantify the added value of employees in creating the value of the entire enterprise (Vithana et al. 2023). The human capital efficiency (HCE) indicator, according to Hasnaoui et al. (2021), presents an indicator that evaluates the knowledge and skills of employees—they are of the opinion that knowledge and skills increase people's cognitive abilities, which also leads to higher performance of employees and the company. Human capital return on investment (HC ROI) is another metric for quantifying the value of HC. According to Vorobyov (2020), it refers to the value that employees contribute to the production of products or to the execution of a service compared to the resources that were spent on them. It makes it possible to better identify and understand the factors that help or hinder the productivity and performance of the company. The last metric is the net present value (NPV), which, according to Shou (2022), represents an indicator aimed at calculating the increase in the value of human capital, which was increased through investments in human capital (three basic types of investments in HC—education, health, working conditions).

To measure the value of HC, it is also possible to use the metrics proposed by us, which were designed directly for a business company, on the example of which we introduce the concept of human capital management into practice:

$$\text{CVHC (cost of HC's value)} = \frac{\text{sum of defects and damages caused by the employee} * \text{personal expenses}}{\text{number of employees}}$$

$$\text{HCI (human capital income)} = \frac{\text{costs associated with claims and complaints}}{\text{sales}}$$

$$\text{HCEH (human capital efficiency per hour)} = \frac{\text{hourly wage of 1 employee}}{\text{number of customers per employee per hour}}$$

$$\text{SHC (sales per HC)} = \frac{\text{sales}}{\text{number of employees}}$$

The benefit is the calculation of these indicators based on accounting documents (financial statements) that companies must publish, i. e. the mentioned data can be obtained from any company, regardless of the state in which it is located, size or industry. Since the HCM issue is usually solved in large companies, our task was to point out the possibility of implementing the HCM concept in a small business firm. Thanks to the mentioned benefits, this article can be an inspiration for other companies that would like to increase their performance and competitiveness through the HC of their employees.

Literature review

Human capital management. In company practice, in addition to human resource management (HRM), the concept of HCM emphasizes and draws attention to current human knowledge, its importance and use for the company, and its systematic development and strengthening. This is how HCM creates advantages over the competition (Podhorcová et al. 2023; Boateng and Olexová, 2023). At the same time, it represents the ability to use the potential of people, both for everyday work and for increasing quality and innovation (Aust et al. 2014; Yang et al. 2022). HCM provides a way to reconcile people's views from an economic and human point of view. Ingham (2007) and Bai et al. (2023) describe that HCM recognizes that people are investors in its HC, which is a significant source of value for the company.

Of course, financial reporting standards do not allow for the accounting of HC, as in the case of financial or physical capital. However, it can be considered valuable, something that, if properly managed, can be recognized and used to achieve not only short-term profit. A strategic approach to HCM is emphasized by several authors, documents, and institutions (Han et al. 2024; EPPP, 2016; Samson and Bhanugopan, 2022). Kearns (2005) and Cam and Özer (2022) understand HCM as the overall development of human potential expressed through company value. In their opinion, HCM is about creating company value through people. Shafiee et al. (2023), Ahluwalia (2015) and Nikitochkina (2021) argue that in today's competitive global economy, companies place more emphasis on developing the potential of their people than ever before. Thus, given the full understanding of the financial impact of this effort, the concept of HCM emerged. HCM can be also understood as an approach to employees that perceives them as an asset whose present value can be measured and whose future value can be increased through investment. Considerations about the necessary measurements in the application of HCM are supported, for example, by Armstrong (2007), Armstrong and Taylor (2014), Dadd and Hinton (2022), Acar et al. (2022), and Dar and Mishra (2021). Companies are beginning to realize the importance of their employees for the development and effective operation of the company (Hryvkivska et al. 2019) and the creation of its value. HCM considers people to be wealth, which is an asset that is necessary to invest constantly, while human resource management perceives people more as a cost item (Sveiby, 1997; Bontis et al. 1999; Bontis, 2001; Bublik et al. 2021; Kaliyeva et al. 2022).

The role of HCM is to obtain, analyse, measure, and evaluate information on the effectiveness of HC. Therefore, in the next chapter, we decided to focus on metrics and measuring the value of HC.

Measurements and metrics within the implementation of HCM. Metrics about the status, decrease, and increase in HC value, the effective use of HC, and the efficiency of investments are essential parts of HCM. If a company knows how to determine the value of HC, it is crucial to determine whether it is used effectively (Plotnikova and Romanenko, 2019; Da Silva and Jardon, 2019). If not, responsible managers need to identify problems and measures that would lead to improving individual company's processes. Accurate quantification of HC magnitude and efficiency is difficult. In any case, when selecting and constructing direct or indirect (auxiliary) indicators, the metrics must be linked to key performance indicators of the company. For companies, this can be, for example, profit, productivity, turnover, market share, etc. (Lin and Weng, 2019; Mehrifar et al. 2023; Contini and Peruzzini, 2022). A difficult part of measuring efficiency in connection with HC usage is primarily the effort to find appropriate measures that would capture the size of the HC.

Some approaches to quantifying the HC value were summarized by Armstrong (2007), Safonov et al. (2023), and Weqar et al. (2022). Other metrics have been published to calculate the HC value, for example, the human capital index—HCI (Wyatt, 2001; Abdelkhalek and Boccanfuso, 2021), human capital monitor—HCM (Mayo, 2001), human capital cost factor—HCCF (Fitz-enz, 2009; Veselinović et al. 2022), compensated income factor, cost factor (Bontis and Fitz-enz, 2002; Koziol et al. 2014). Several authors have suggested using different metrics to calculate HC efficiency, for example, human economic value-added—HEVA (Fitz-enz, 2009; Wijaya, 2021), human capital effectiveness—HCE (Andriessen, 2003; Polcyn, 2021), human capital value-added—HCVA (Marr, 2012; Meizary et al. 2023), human capital market value—HCMV (Fitz-enz, 2009; Veselinović et al. 2022), total cost of workforce per FTE—TCOW per FTE (HCM Institute, 2023).

One of the most used understandings of measuring the effective use of HC was a study by Bontis and Fitz-enz (2002). The proposed conceptual framework for measuring HC efficiency through four metrics is also used by other authors such as Kucharcikova et al. (2016), or Mubarik et al. (2018). Within it, HC efficiency measurement usually uses a conceptual model through four primary metrics: revenue factor, cost factor, profit factor, and HC ROI. However, we consider the last of these factors to be a metric related to the efficiency of investments in HC. The first three metrics are directly influenced by the size of costs, profit, or income in the numerator, while the denominator includes the FTE indicator (number of full-time and part-time employees and number of temporary workers). In essence, however, it is an indicator of labour productivity. Investing is the tying of funds to obtain financial compensation for the investor in the future for the time when he tied up his investment funds (Malichova and Mičiak, 2022). The most common methods for evaluating the effectiveness of investments in physical capital are return on equity—ROE, return on total capital—ROA and return on long-term invested capital—ROI, payback period, and methods with discounting criteria (net present value, economic value-added, internal return percent) (Kislingerová et al. 2010; Chen and Rahman, 2023). Investments in HC are all costs associated with increasing the scope and quality, increasing the efficiency of HC, and prolonging its operation (Becker, 1964; Chhaochharia et al. 2024; Terai, 2023). To evaluate investments to HC, researchers modified different approaches to the traditional method (return on investment—ROI) (Mankiw et al. 1992; Fitz-enz, 2009; Evans, 2007; Manuti and de Palma 2014; PwC, 2023; Wijaya,

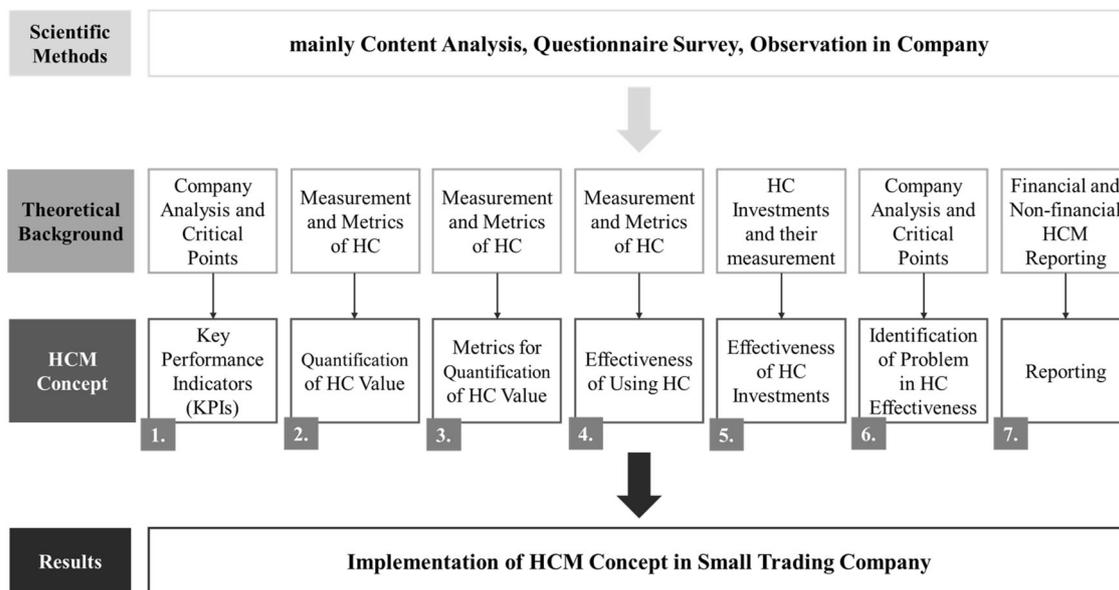


Fig. 1 Conceptual framework—connecting the literature background with the HCM concept implementation. Source: Own processing.

2021; Meizary et al. 2023; Dadd and Hinton, 2022). The difference lies mainly in how they understood what investment to the HC is. In some mathematical relationships, investing in HC is represented by the cost of one specific activity to increase the HC available in the company. In other relationships, investments in HC are defined by employee remuneration (compensation) or total employee-related costs. Due to the specifics of HC in every company, it is impossible to consider these metrics universal.

Theoretical framework. In both sections, as part of the literature review, we briefly characterized the theoretical basis of our results (Fig. 1). The conceptual framework consists of four levels. The first of them consists of scientific methods (content analysis, questionnaire survey, observation in the company), through which we obtained primary and secondary, quantitative, and qualitative data necessary for the creation of the article. The second part of the framework consists of the theoretical background, on the basis of which it was necessary to define basic terms and connections between them, as well as to point out the possibilities of HC quantification. The individual theoretical starting points were linked in the conceptual framework to its third part, namely the seven-step HCM concept. This concept, including the design of metrics for measuring HC and the efficiency of HC use, was implemented in the real conditions of the chosen small trading company “Market”.

HC and its impact on the company, investments in HC, metrics and ways of measuring the value and effectiveness of HC were defined, and we also pointed out the importance of investing in HC. All the mentioned areas are part of the seven-step HCM model, which we implemented in the conditions of a real small trading company.

Methods

The article aims to explain the essence of HCM, offers new metrics for measuring the effectiveness of HC, and wants to point out a possible approach to implementing HCM in a specific small trading company.

Scientific methods. The article uses various scientific methods, such as observation, analysis, synthesis, statistical analysis, induction, comparison, or the method of questionnaire survey.

These methods were used to fulfil the defined objective of the article.

We used the analysis method both when analysing the content of scientific articles, which provided us with a theoretical basis for fulfilling the article’s goal, and when analysing internal documents, from which we obtained a practical basis for the fulfilment of the goal, the obtained data related to the areas human resources and HC, training in the company, financial results, etc. We applied the comparison when comparing the opinions of individual authors on the investigated issue, but also when comparing total and partial indicators to determine the value and effectiveness of HC. Synthesis is the opposite of analysis; simultaneously, it complements it and forms a necessary whole with it. We used the synthesis to select suitable indicators to measure the value of HC, the efficiency of HC, and the efficiency of investments in HC. Also, in the creation of a proposal for the calculation of indicators of effective use of HC. We used the deduction and induction to derive generally applicable rules for specific company conditions and to create and evaluate a proposal for implementing HCM. Authors, such as, for example, used these basic scientific methods in their articles (Boateng and Olexová, 2023; Podhorcová et al. 2023; Cameron et al. 2024; Lee et al. 2023).

Mathematical methods were applied to create formulas to calculate HC metrics associated with company performance. The design of the formulas was based on the review of the literature and the results of the observation in the selected small trading company. It was through this method that part of the stated goal of the article was fulfilled—the proposal of new metrics for evaluating the effectiveness of HC.

We chose observation as the main method of obtaining the data necessary to fulfil the article’s aims. Through it, we obtained data about the selected small trading company, in the conditions of which we proposed the implementation of the HCM concept, including metrics and the method of measuring and quantifying the value of HC. We applied this method mainly when obtaining data related to the company’s operating principle, the way in which employees with their HC participate in achieving the company’s performance, but also the method of rewarding performance and using indicators designed to measure the value of employees’ HC. The observation method was also used by Koman et al. (2023).

Questionnaire survey. In the article, we use the results of a questionnaire survey, which was conducted in the past only in connection with pointing out the importance and topicality of the topic of the article and the investigated issue. The authors of the articles use the method of sociological research in the form of a questionnaire survey technique mainly for the advantages that result from the use of this technique, such as quickly obtaining more answers from different corners of the country without the need for travel or physical contact with the interviewer. Thanks to this method, researchers can save time as well as money. The questionnaire survey was also used by the authors whose studies we process in our paper (e.g. Afriyie et al. 2022; Hitka et al. 2014; Malichová and Mičiak, 2022; Oladimeji et al. 2023, Yao-Ping Peng et al. 2024; Lee et al. 2023).

The questionnaire survey, on the basis of which we claim that it is an interesting and current issue, was carried out at the turn of 2016 and 2017. The respondents were managers of commercial companies. A total of 350 companies were contacted at that time, and all companies filled out the questionnaire (the return rate of the questionnaire was 100%). Despite the fact that it is older data, the obtained results were very interesting and provided us with the basis for the creation of this article. Since this research is only a starting point for solving the problem in the article, we publish only some necessary facts about it.

The questionnaire at that time (2016–2017) consisted of open (space for the respondent's statement) and closed (yes/no answer) questions. At the beginning of the questionnaire, the identification part of the companies was examined, where we will include questions regarding the size, industry, nationality of the owner (domestic, foreign), duration of operation on the market, and average age of employees. The size criterion of companies in Slovakia is divided according to the number of employees as follows: micro (1–9 employees), small (10–49 employees), medium (50–249 employees), large (250 or more employees) company. The most represented were medium-sized enterprises (36%), followed by small (29%), large (22%) and micro (13%). Within the sectors, 63% of enterprises operating in the service sector filled out the questionnaire, and 37% were manufacturing enterprises.

The core of the questionnaire focused on the HCM concept, including measurement and metrics. At that time, the questionnaire monitored the impact of HC on the company, the use of the HCM concept in the company, the use of metrics to quantify the value of HC and to measure the effectiveness of the use of HC, including their specific types, or the reasons for their creation. The absence of these metrics was also investigated. It also monitored the use of metrics for evaluating the effectiveness of investments in HC, their specific types, reasons for absence in the company, or principles for the introduction of the HCM concept in the company, as well as future changes in the use of HC.

Among the biggest findings from the questionnaire, which provided the basis for the creation of the article, we included the fact that up to 89% of participating companies do not use HCM. The main reason they gave was ignorance of the concept of HCM, its meaning, and its contribution to the company itself. However, it was positively assessed that companies at that time were aware of the impact of investments in HC on the overall performance of the company, but mainly on its profit (on average 4.86 points out of 5 possible). Managers in companies understood HC as a significant cost item, which forced them to minimize their costs. Companies did not implement metrics to measure HC mainly because they were unfamiliar with them and did not know how to measure HC. In the case of metrics for measuring the effectiveness of HC investments, most companies stated that they did not need this indicator to operate successfully. For their measurement, classical indicators, such as labour productivity or

the percentage of product failure, were sufficient. Therefore the main problem was identified as the lack of awareness of companies about the nature and importance of HC for the company.

Results—Example of HCM implementation

Based on the results obtained from the survey, we decided to point out the possibility of simple but effective implementation, including the procedure and use of some metrics from the field of HCM in small and start-up companies in the field of service provision. It is a trading company with an orientation in retail sales of food and consumer goods, which has been operating on the market since 2016. The mission of the company with the brand “Market” is to create opportunities for young people, promote a healthy lifestyle, and be a role model in reducing food waste. Implementation demonstration and statistical data from 2016 to 2020 provided by “Market” were used (we do not publish the actual name of the company) (Grivalská, 2016).

The HCM process must be in line with the company's strategy. The complete HCM process consists of seven phases that follow each other. In the first phase, critical company processes are identified so that key HC components and key performance indicators (KPIs) can be assigned to them. The determination of KPI is dealt with, e.g., Stacho et al. (2021). This achieves the connection of the whole process with achieving high performance. Performance and sustainability development is a fundamental definition of company success and how companies achieve their objectives (Tokarcikova et al. 2014 Janosova and Tokarcikova 2021). Through the synergies of various areas of the company, which also includes HCM, the company can invest more effectively precisely in sustainable solutions (Holubcik et al. 2023). Subsequently, it is necessary to quantify the value of HC directly or indirectly in the company. In the third and fourth phases, the HC efficiency is evaluated using appropriate metrics. The remaining phases of the process then include the identification of deficiencies in the area, adopting corrective measures, and communicating results through reporting. Given the above text, in the article, we have shown and commented on the implementation of the HCM process in the conditions of a small trading company. The identified critical company process is the process of selling food and consumer goods.

Key performance indicators (KPIs). “Market” is a retail trading company, so we consider sales a key performance indicator. Sales have been growing steadily since opening. During the financial year 2018–2019, the sales began to stagnate due to the departure of the tenant (butcher), who supplied fresh goods. During the financial year 2019–2020, sales increased by 18%, as a gradual “refit” of trade began, the listing of new items, and quality and whole “fresh” departments were built (Table 1).

Quantification of HC value. Selected data relating to the number, structure, and movement of employees are necessary for the use of metrics of HC value, efficiency of HC use and efficiency of investments in HC. This data is also beneficial for analysing the development of these metrics and their impact on company performance. As of January 2020, the “Market” employed 34 people, of which 16 were permanent employees, and 18 were

Table 1 Development of sales and profit of “Market” (€).

Parameters	2016–2017	2017–2018	2018–2019	2019–2020
Sales (€)	390,000	549,000	595,000	700,000
Profit (€)	19,500	65,880	47,600	70,000

Table 2 Development of the annual turnover rate of employees and temporary workers (%).

Employees	2017-2018	2018-2019	2019-2020
Full-time employees	1.71	1.15	1.67
Temporary employees	6.03	6.52	6.08

temporary workers. The “Market” has mostly stable employees, but temporary workers change frequently. The increase in temporary workers is recorded mainly in the summer months and during the Christmas period. One of the main priorities of the “Market” is to create opportunities for young people using their potential and sophisticated skills. The company tries to adhere to this priority. The age structure of the majority (53%) of permanent employees is between 25 and 40 years, and temporary workers up to 25 years. Employees with a secondary education degree have the largest share, up to 47.06%. 14.71% of employees have a university degree. The remaining 38.24% are students employed by the “Market” as temporary workers.

The turnover rate as an indicator of employee movement has a crucial informative value about employee behaviour and is generally used as one of the indicators of HC. High fluctuations can cause a low return on investment in HC. However, a certain degree of fluctuation is necessary and is not a negative phenomenon because new employees also come with new thinking, experiences, etc. Thus, fluctuation can also lead to an increase in the HC value in the company. The optimal turnover depends on the company’s area of company, the profession, the required qualification, and the length of the adaptation process of employees. A fluctuation rate below 5% is acceptable (Zalai et al. 2004). Low turnover helps the company maintain innovation potential and growth. If it reaches 5% and higher, its adverse effects prevail. The turnover rate was expressed as the total number of redundant employees’ ratio to the average monthly number of employees in%. The turnover rate of employees with full-time contract is around 1–2% in all years of operation. This turnover rate indicates the high sustainability of its permanent employees. The manager’s efforts should aim at ensuring that employees apply their competencies in the work they perform, thus increasing their subjective job satisfaction and, at the same time delivering higher work performance. Maintaining a satisfactory turnover rate can save the cost of hiring and adapting new permanent staff (Table 2).

The annual turnover rate of temporary employees is slightly above 6%. This fact harms the company’s overall operation and the achievement of its sales and profits. Employees must constantly train new temporary workers and devote their working time to them. Temporary employees reduce employees’ work performance by constant questions and problems, which disturbs the atmosphere and causes nervousness among colleagues. This higher temporary worker turnover rate also negatively impacts customer satisfaction (Ližbetinová et al. 2020b). The customer feels insufficient information about the goods and services, the customer service time is decreasing, and the critical attention is missing.

Metrics for quantification of HC value. After analysing the nature of the various metrics that are reported in the literature and identifying their advantages and disadvantages for use in HCM in small and young companies, we propose to use the human capital cost factor (HCCF) metric to calculate the HC value in a small trading company “Market”. HCCF metric

Table 3 HCCF development (€).

Parameters in Euro (€)	2017-2018	2018-2019	2019-2020
Wages	97.488	97.488	109.788
Costs of benefits	0.520	1.257	1.491
Wages of temporary employees	17.002	19.430	23.673
Costs associated with turnover and absence	3.969	2.646	2.771
HCCF (€)	118.979	120.821	137.723

Table 4 HC utilization efficiency metrics.

Title	Metrics
HCVA	$\frac{\text{sales} - (\text{costs} - \text{wages and benefits})}{\text{FTE}}$
HCE	$\frac{\text{operating benefit} - \text{HC}}{\text{HC}}$

calculation according to Veselinović et al. (2022):

$$\text{HCCF} = \text{wages} + \text{cost of benefits} + \text{wages of temporary employees} + \text{costs associated with turnover and absence}$$

The lowest HCCF was in operation in the first financial year. At that time, most of the costs were spent on adapting new employees their training and inclusion in the team. As all employees worked in the company for less than one year, no employee loyalty costs were incurred. In the financial years 2017–2018 and 2018–2019, the costs of the HCCF were approximately the same, amounting to around €120,000. In addition to payroll costs, in the financial year 2018–2019, the company “Market” increased the costs of loyalty rewards paid to 13 employees and the cost of severance pay for two employees. The highest costs for the HCCF were in operation in the financial year 2019–2020 for €137,723. This year, the salary of employees was increased by the regional component paid monthly in the amount of € 36.50, and the costs of a new employee and the costs of severance pay for two employees were incurred (Table 3). As the company has a high degree of stability, we cannot discuss rapid increases in HCCF costs. Increased costs are usually associated with loyalty rewards for employees who have worked in the company for at least one year or with an increase in the employees’ wages themselves. The HCCF indicator recorded a gradual increase in all financial years. Since this factor, by its construction, denies the very essence of HCM, which considers HC not as a cost but as wealth, we recommend using the HCCF metric only as a supplement.

Effectiveness of using HC. Based on the assessment of the suitability of the construction of the presented indicators for measuring the HC effectiveness, we selected two metrics in the “Market”, namely HCVA and HCE (Table 4). These use output size data in various forms in the numerator, but to some extent, they also consider the cost of HC or the value of HC, which is not observed with the remaining metrics. The calculation of HCVA is given according to Meizary et al. (2023) and HCE according to Polcyn (2021).

In the metric of the efficiency of the use of HC, i.e., HCE, the denomination of HC should be used in the denominator. To determine the size of HC, we used HCCF data calculated in the previous section (Table 5).

The HCVA and HCE metrics decreased in 2018–2019. At that time, the company was affected by external factors, such as the departure of the tenant (butcher) from the operation, and the lack of fresh goods, which subsequently caused customer

dissatisfaction. Increasing customer dissatisfaction greatly affected work performance, employee reluctance, and a bad atmosphere in the company. On the contrary, the financial year 2019–2020 brought the operation and increased HCVA and HCE by almost 11% compared to the previous financial year. A significant share increase was due to the overall refit of the store, the addition of a “fresh” department and the offer of new, high-quality types of goods, or the implementation of training courses for employees.

Because metrics of efficient use of HC use financial results in various forms, their development is very similar. However, there is a lack of more precise metrics targeting the critical process of the monitored company.

Effectiveness of investments in the HC. The effectiveness of investments into the HC, like physical capital, wears out, so it is necessary to invest in it. Investments in HC have three primary forms. These are investments in education, health and working conditions, including workplace safety and workplace ergonomics. In addition to assessing the effectiveness of investment projects in physical capital, companies should also monitor the effectiveness of investments in HC. The questionnaire survey in the Slovak Republic showed that most companies consider investments in HC only as costs associated with educational activities. Although some of the proposed HC efficiency metrics were published long ago, many managers still do not know any metrics to calculate this efficiency or even consider it unnecessary to measure it.

“Market” invests in HC of its employees through education and health improvement. For illustration, the article points to the possibility of using two metrics to calculate the effectiveness of investment in educational activities of the monitored company, namely human capital return of investment—HC ROI, net present value (NPV) (Table 6).

Companies need to realize that investing in HC leads to an increase in the level of HC, which increases their overall performance. One of the most important areas of investment is investing in the training and development of its employees. The company focused on educating its employees about current trends in retail sales, thereby increasing sales efficiency. She conducted behavioural interviews to better place employees in individual positions. Employees have increased their skills in

working with objections and arguments, loss prevention and safety through STORLINE training. The manager completed My job (Training Days), where he increased his qualifications in the field of people management. Employees also had the opportunity to study emotional intelligence, language courses and food technology (Table 7). The terms in Table 8 include trends (Consumer Retail Trends), training names (Loss Prevention and Safety Training, My Job, Storeline, Objection and Argument Work, EQ Certification, Food Technology Training, Language Training). The term “Behavioural interviews” in our case, which represent methods designed for employees and based on “observational behaviour”, i.e. employees learn by observing an older, more experienced colleague—e.g. mutual conversation, during which he observes the other’s behaviour, that is, how he reacts to a certain situation.

Human capital return of investment—HC ROI. The effectiveness of investment in courses and training was calculated by using the HC ROI metric (Table 8).

If the value of the HC ROI indicator is positive, the investment will bring a profit, otherwise a loss. In deciding on these investments, in addition to the amount of investment and the expected return, it is necessary to consider the risk that arises from investing in HC.

Table 5 Development of HCE (€).

Indicator	2017-2018	2018-2019	2019-2020
Sales (€)	549,000	595,000	700,000
Costs (€)	438,120	547,400	630,000
Cost of wages and benefits (€)	115,010	118,175	127,945
FTE	30	31	34
HCVA	6030	5348	5822
Total operating profit (profit after taxation) (€)	50,728	37.12	54.60
HCCF (€)	118,979	120,821	137,723
HCE	1.43	1.31	1.4

Table 7 Costs of investments in the educational activities (€).

Financial years	Investment area	Investments costs (€)
2017-2018	Trends in trade in consumer goods	1250
	Behavioural interview	225
	Total	1475
2018-2019	Loss prevention and safety trainings	1200
	My job (Training days)	200
	Training STORLINE	900
	Working with objections and arguments	630
	Total	2930
2019-2020	EQ certification	944
	My job (Training days)	250
	Food technology training	640
	Language courses	800
	Total	2634

Table 8 Values for HC ROI calculation (€).

Indicator	2017-2018	2018-2019	2019-2020
Total operating profit (profit after taxation)	50,728	37,128	54,600
Total investment costs	1475	2930	2634
Net return on investment	49,253	34,198	51,966
HC ROI	33.39	11.67	19.73

Table 6 Metrics of HC investment efficiency.

Title	Metrics
HC ROI	$\frac{\text{total operating profit} - \text{investment costs}}{\text{investment costs}} \times 100 = \frac{\text{net return on investment}}{\text{investment costs}} \times 100$
NPV	$\sum_{t=1}^n \frac{R_t}{(1+i)^t} - C_t$ R_t ... revenues from investment; i ... discount rate of return; t ... number of timer period; C_t ... present value of invested cash

Table 9 Present value of cash inflows from investing to the EQ certifications (€).

Year	Cash inflow (€)	Rate to deduct interest	Discounted cash inflow (€)
1.	17,500	0.95	16,625
2.	17,500	0.90	15,750
3.	17,500	0.85	14,875
4.	17,500	0.80	14,000
5.	17,500	0.75	13,125
Total	87,500	-	74,375

Net present value (NPV). NPV is a method that is often used in evaluating investments in physical capital. However, with the investment in HC, it is specific that while the costs of investing in HC are realized relatively short, the expected benefits may flow for a long time. Estimating these expected benefits when calculating the return on HC investments is challenging. For this reason, we recommend using the NPV method for individual educational activities or short-term educational programmes.

To evaluate the effectiveness of the investment (by using the NPV method), an investment in educational training is selected, the output of which is an EQ certificate valid in the countries of the European Union. “Market” anticipates that the returns on this investment will flow over the next five years and that the useful life has been determined. The cost of the investment during the financial year 2019/2020 was €118 per employee. Eight employees (€944) took part in the EQ certification. In Slovakia, training works in such a way that you have a training centre that determines the amount for the training, the company pays it, and the employees are trained—that is, the amount of €118/employee includes all the time of the trainer and the employee, the documents and the resulting certification (taking the exam, printing and handing over certificate). Therefore, we cannot specify the training costs in more detail—we only received the information from the company that we presented in the manuscript. The present value of cash inflows from investing in EQ training is the sum of the discounted cash flows over the years of the investment, and the required rate of return is set at 5%. The present value is calculated as the sum of discounted cash inflows from investments in individual years and considers a rate of return of 0.05. This year, employees used EQ certifications to learn to develop their emotional intelligence. Also, to successfully manage customer requirements and relationships with other people. The cash inflow from investing in the EQ certifications in the first year will increase the company’s sales by 2.5%, and the investment will generate the same cash inflow throughout its life (Table 9). The expected 2.5% increase in sales and consistent cash flow are based on the company’s actual data, the calculation of NPV and the determination of the increase in sales were also communicated with the owner of the company, who understands the issue and set the indicated percentages (however, detailed data cannot be shared because it would be possible to identify the company based on them).

The current value of cash inflows over 4 years is €14,375. The net present value is determined as the difference between the present value of cash inflows and investment costs (74,375–944), then $NPV = €73,431$. A positive NPV value is a prerequisite for excess income compared to investment costs. Investments in EQ certifications should bring the desired effect to the company, while the amount of NPV depends mainly on determining future cash income in the coming years. These can also be estimated by considering the following factors: managing one’s moods, perceiving what colleagues are experiencing, motivating oneself and others (Hitka et al. 2014), using initiative effectively, a hidden

source of success, creatively working with one’s resources to work well, developing essential components of emotional intelligence.

Identification of problems in the field of HC effectiveness. In the company “Market”, there is a low turnover rate of employees working full time. The problem, however, is the higher rate of fluctuation of temporary workers, which negatively impacts the operation’s overall operation, achieving its profit, full-time employee performance, or customer satisfaction. The company must solve this problem in the future, for example, with the help of various motivational tools oriented towards temporary workers.

The HC effectiveness area consists of two components. It is the effectiveness of using HC and the effectiveness of investments in HC. Within this stage of the HCM process, evaluating both components of efficiency is necessary. The HCVA and HCE indicators cannot sufficiently express how the individual HC components are used in operation. It is necessary for the manager, based on his work experience, creativity and to assess the fundamental key performance indicators of the operation, *t. j.* sales or profit, or based on specific conditions of operation in retail, he proposed his metrics for the company. These metrics should best reflect the specifics of the retail company and be able to best assess the level of HC utilization so that operations continue to not waste HC’s human potential but also financial resources. The company “Market” invested in HC very carefully.

Although the results of the indicators are positive, it cannot be stated unequivocally that the operation has invested effectively. Investments went only to areas that, in most cases, represent the so-called “Compulsory driving” for retail consumer goods to achieve the highest possible performance. These were mainly investments in education, and only a few investments went into the health of employees or the ergonomics of the working environment. The company only made mandatory investments in occupational safety. Nevertheless, we used the HC ROI indicator to find that the return on investment in HC education is slowly increasing. At present, the operation’s priority is to improve employees’ communication skills in foreign languages and their overall communication skills with a focus on fulfilling their strategic goals. When proposing to increase the efficiency of HC and investment in HC in the company “Market”, it is necessary to consider the work motivation itself, which affects the work environment, quality of management, training opportunities, setting the remuneration system and others.

Design of metrics and measures to improve the situation. For the effective functioning of the company, it is not enough to identify problems in the field of work with HC employees; it is also necessary to take appropriate corrective measures. As part of this stage of the HCM process, we proposed in the article a demonstration of creating our simple metrics that best reflect the specifics of a company that deals with retail sales and can assess the level of use of HC. These metrics will consider key performance indicators, *i.e.*, sales and specific operation conditions in the retail sale of consumer goods.

Metric A: Average sales per employee. The main indicator of the company’s “Market” is the sales. Sales depend mainly on the employees who serve the customers, and it is the employees who are the bearers of HC. For this reason, it is very important to know what the share of sales per employee is—this way, we will find out the effectiveness of HC, *i.e.*, whether it made sense (whether it was effective for the company) to spend money on investments in HC (education, working environment, health status). Efficiency is most often expressed by the ratio of output

Table 10 Calculation of Ø turnover per employee/monthly in the financial year 2019–2020 (€).

Month	Ø sale per shift/month (€)	Ø number of full-time employees in one shift/monthly	Ø number of temporary employees/monthly	Ø sale per employee/monthly (€)
February	26,800	5	2	3829
March	29,800	4	3	4257
April	29,400	5	2	4200
May	32,200	5	2	4600
June	28,400	4	4	3550
July	26,200	3	5	3275
August	26,800	3	5	3350
September	30,000	4	5	3333
October	27,200	4	4	3400
November	31,300	5	2	4471
December	30,500	4	4	3813
January	31,400	5	2	4448

and input. Substituting the value of the average sale per entry point and the average number of employees (full-time employees + temporary employees) in one change per entry point, we get the indicator of the average sale per employee per work shift.

In this part (“Design of metrics and measures to improve the situation”), we work with formulas that include the sign “Ø”. In the article, this sign can be interpreted as “average, average value”, i.e. the value obtained by averaging several values, e.g. per week, month, year.

$$\text{sales per employee} = \frac{\text{Ø sales per shift}}{\text{Ø number of employees per shift}}$$

Table 10 calculated the average monthly sales per employee (full-time employees + temporary employees) per work shift. As part of the operation, employees work on two changes per day. The lower average number of employees at full time is in the summer months and during the holidays when they take holidays or are unable to work. Then the company employs a higher number of temporary workers.

Average monthly sales copy the number of full-time employees in one work shift. The higher the number of employees working full-time in one shift, the higher the average monthly sales per employee (Table 10). Full-time employees can make better use of their long-term acquired skills, knowledge, and abilities, which are necessary for the operation’s successful operation. With fewer full-time employees in one work shift, the “Market” employs a higher number of temporary workers to maintain average monthly sales. At present, this trend of employing a higher number of temporary workers does not positively affect the work performance of the company. With a higher number of part-time workers, operating sales are relatively lower, which is also due to the high turnover of part-time workers. Temporary workers do not have sufficient experience, information, and skills and thus reduce the overall work performance of employees.

Metric B: Average sales per customer per change. To assess the overall efficiency of the company “Market”, we can use an indicator expressing the average sales for customers per work shift. Employees’ effective use of knowledge, skills and abilities is reflected in increasing overall sales and competitiveness. The advantage of this indicator is higher objectivity, as it is converted to the number of customers. We get the indicator’s value as the share of average sales of the company per work shift and the average number of customers per work shift. The average number

of customers per shift equals the average number of printed blocks per work shift recorded by the information system.

$$\text{Ø sale per customer per shift} = \frac{\text{Ø sale per shift}}{\text{Ø number of customers per shift}}$$

Currently, the company is visited by an average of 300 customers per shift. The average sale per customer for one shift is currently €3.24. This value is not high. Most customers buy only small quantities of goods at lower price levels.

$$\text{Ø sale per customer per shift} = \frac{972.22}{300} = 3.24\text{€}$$

Of course, the higher the value of this indicator, the more efficient use of HC means. Increasing this indicator can bring more efficient and better communication of employees with each other, especially with customers, or the creation of an employee offer for customers. The higher the number of temporary workers than full-time employees in one shift, the lower the average sales per employee. The manager must address this issue. It is necessary to better monitor the situation in the workplace and increase investment in HC, which later led to increased company performance and HC efficiency.

Reporting on HC. Reporting the results achieved in the field of HC represents the final phase of the HCM process. It respects the principles and procedures for creating other important corporate reports and responds to the specific nature of HC as a corporate input. The reports created in the company can be oriented inward or toward the company’s external environment. In the internal orientation of reporting, a combination of analytical indicators (related to the management of the company’s costs) with indicators in kind, which are related to the quality of the performed activities or to the time intensity of these activities, is usually used. To better capture the actual situation, it is possible to use a breakdown separately in the reporting according to the types of services, work teams or customer groups. The reports then include the results of the individually selected indicators and explanatory comments and justifications. In this way, it is possible to use the created reports in the management of the company and for the communication of important facts, in this case, the facts related to HC and its use (Šoljaková and Fibířová, 2010) and with the use of IS (Koman et al. 2023).

Discussion and conclusion

HCM is an approach where people in a company are viewed as an intangible asset that forms part of the value of the company and not as a cost item (Kozioł, 2018; Lubacha, 2023). Our ambition was to explain the essence of HCM and point out the possible approach to implementing HCM in company practice on the example of a concrete small trading company. The implementation of HCM is about finding a link between a key performance indicator of the company and its employees’ effective use of specific fundamental knowledge, skills, and abilities (Blaga et al. 2021; Wisawapaisarn and Yodmongkol, 2021; Bulinska-Stangrecka and Bagienska, 2021). It is also necessary to propose metrics within the HCM concept for measuring and evaluating the effective use of HC and the effectiveness of investments in this corporate input. For a company, it is beneficial to compare metrics in benchmarking with other companies and then take corrective action (Voronkova et al. 2020; Šikýř and Šafránková, 2018).

Due to its qualitative nature, human capital is very difficult to measure, which we already pointed out in the theoretical part of the manuscript. In order to give a practical example of the introduction of the concept of human capital in a real company (which previously did not have this concept in place), we

modified the formulas used and proposed in the manuscript so that, based on the available data (number of employees, sales, labour costs, training costs, etc.) could quantify the value of a given company's human capital. We are of the opinion that human capital must be monitored not only through wage costs, but e.g. also the amount of investment in human capital. However, the company did not have such data (they only collected common information, which we, as authors, had to examine in detail and divide into groups).

The quantification of human capital is an unexplored area, the authors cannot clearly agree on uniform terms and uniform metrics. Therefore, quantification is difficult. Quantification is also made more difficult by the fact that many companies talk about human resources and not human capital, so often companies do not even have the appropriate data collected. For this reason, there are situations in research practice where the authors adapt the metrics of human capital quantification to the conditions of their country.

The value of human capital is related to the number of employees, but it is not strictly limited to this number. Each employee has human capital, that is, the number of employees indicates how many employees the company works with, how many of them need to be retrained, or increase their expertise, which is related to human capital (this is investment in human capital).

Various items can be used for metrics to quantify the value of HC, such as sales, profit, number of completed educations, education costs, costs for adjusting the working environment or supporting the employee's health. In Slovakia, business enterprises do not keep records of sales by employee, but overall, for a certain period (day, week, month, year). It is also necessary to consider employee turnover, which is why the average number of employees was used in the formulas. The number of employees can also be interpreted as full-time equivalent (FTE), which also includes part-time or part-time workers—i.e. the FTE indicator is identical to the number of employees. It is the FTE indicator that is used when calculating the return on investment in HC, the economic added value of HC (Fit-enz, 2009), or the added value of HC (Marr, 2012).

When implementing the concept of HCM and metrics to quantify HC, we identified key performance indicators in a small business, among which we included sales and profit. The reason was that it is a trading company, i.e., a company that sells products to end consumers. For this type of company, sales are the key indicator, based on which the amount of remuneration for employees is also determined.

The important elements that we analysed within the HCM concept were the number, structure, and movement of employees—both permanent and temporary. Based on the indicated indicators, we calculated the amount of fluctuation. We found that the turnover of permanent employees, i.e., those who work in the company on a permanent employment basis (on a contract), is in the range of 1–2%. This can be evaluated very positively, because the recommended level of fluctuation, which companies should not exceed, was set at the level of 5%. We negatively assess the turnover of part-time workers (especially students working on an agreement), which is at a level of more than 6%. This result indicates that the company does not have permanent part-timers who work in the company throughout the year, but rather seasonal part-timers who work in the company, especially during the summer holidays and the Christmas period. Because the company always hires new part-timers in the mentioned periods of the year, permanent employees spend their working time constantly training new part-timers, who often do not enjoy the work and do it only for the salary.

Based on selected elements from the company's environment, we proposed the calculation of HCCF, HCVA, HCE, HC ROI and NPV metrics. All metrics have acquired positive values, based on which it can be argued that the company is increasing the value of HC, and the investments made in HC will bring excess income to the company in the future. We found out that, as part of the investment in HC, the company mainly uses training to handle different types of customers and their objections, the training aimed at preventing incidents, training to increase work safety, language courses, courses focused on emotional intelligence, or working with technologies in the retail sector. In addition to them, the company manager can also use training to improve skills in the field of employee management. We consider training focused on emotional intelligence to be very suitable for this sector of the company. It is the behaviour and actions of employees that affect the satisfaction and loyalty of customers who bring revenue to the company. If an employee can empathize with the customer's feelings, behave pleasantly and willingly help the customer, this will contribute to customer satisfaction. It will also lead to an increase in their loyalty and an increase in average sales (currently at the level of €3.24 per month per customer). It is substantial to draw attention to the fact that the HCCF indicator considers HC as a cost (contrary to the HCM concept), therefore, we recommend using it only as a supporting additional indicator. The quantification of the value of HC, its efficiency and investments were also addressed by the authors of Da Silva and Jardon (2019), Dar and Mishra (2021), Veselinović et al. (2022), Dadd and Hinton (2022), Acar et al. (2022) and Meizary et al. (2023) who came to the same conclusions—measuring HC is very complex and often only an approximate expression of its value.

However, to implement the HCM concept associated with the requirement to increase not only the performance but also the competitiveness and sustainability of a company (Terán-Yépez, 2020; Vergara-Romero et al. 2021), it is necessary to adapt efficiency indicators to specific company conditions, in the context with the field of company and corporate strategy. Decision-making by managers is currently increasingly supported by IS/ICT and thus contributes to the financial and economic sustainability of the company (Koman et al. 2022). Given that no uniform metrics are adopted and used in this area, it is the role of HCM managers to use their knowledge, creativity, and analytical thinking and design HC efficiency metrics for their company conditions to guide care for HC towards increasing individual performance as well as the performance and competitiveness of the entire company. To this end, it is necessary to organize regular professional educational activities.

The article represents a contribution to the field of theory and the field of practice. Within the framework of the theory, the findings from the analysis of the theoretical background were systematized and linked to the HCM concept, which is still a not-so-familiar term for most managers. The proposal of concrete metrics for quantifying the value of HC and investments in HC is also a theoretical contribution because this is a very problematic area (the difficult process of quantifying HC), which is addressed by a few authors. Therefore, there was an expansion of existing theories and a deepening of the knowledge not only of scientists but also of the public.

From the point of view of practice (managerial implications), this is a practical example of the implementation of the HCM concept, including the quantification of the value of HC in a small business company. This example can inspire managers of other companies who decide to implement the HCM concept and pay attention to it. Through the implementation of the HCM concept, including the introduction of metrics to determine the size and efficiency of HC and investments in HC, managers maximize the potential of employees, connect the field of human resources with

the strategic goals of the company, which can lead to an increase in the performance and competitiveness of the company and emphasizing sustainability (Hitka et al. 2021).

We see the consequences of the article for society and politics in the increase of customer satisfaction and loyalty for the retail sector of the company, which in Slovakia makes up the highest share of the total number of companies. However, since the HCM concept can be applied to any company, the situation in the employee–customer relationship can be improved in all industries. The concept of HCM and measuring the efficiency and value of HC has an impact on the strategic decisions of managers in all areas—finance, environment, marketing, production, and logistics. Therefore, even thanks to the introduction of the HCM concept, the sustainability of business in the country can be supported and more ecological methods of transport, production, or communication (marketing) can be used.

In the future, we would like to focus our research on the area of HC reporting (in the example of a specific large company) and the connection of the HCM concept with digital technologies (in the example of a specific small and large company and their comparison).

Data availability

Data sets generated by exploratory research during and/or analysed during the current study are not publicly available due to the GDPR protection of the analysed small business. The business did not wish to publish its business name.

Received: 28 August 2023; Accepted: 16 October 2024;

Published online: 28 November 2024

References

- Abdelkhalik T, Boccanfuso D (2021) Human capital index (HCI)—from uncertainty to robustness of comparisons. *Appl Econ* 54(28):3246–3260. <https://doi.org/10.1080/00036846.2021.2005768>
- Acar OF, Tunca MZ, Ipcioglu I (2022) A conceptual study on classification, measurement and dimensions of intellectual capital. *J Mehmet Akif Ersoy Univ Econ Adm Sci Fac*. 9(1):700–719. <https://doi.org/10.30798/makuiibf.911134>
- Adomako S, Amakwah-Amoah J, Frimpong K (2022) Human capital, reverse engineering and new venture growth: the moderating role of competitive strategy. *Technovation* 114:102520
- Afriyie EO, Owusu-Acheampong E, Arkaife SJ, Musah OD (2022) Recruitment and selection, training and development on job satisfaction mediated by motivation: exploratory and confirmatory factor analysis in the Ghanaian SMEs. *J Hum Resour Manag—HR Adv Dev*. 25:1/2022. <https://doi.org/10.46287/jhrmad.2022.25.1.5>
- Ahlwalia AK (2015) Human capital management (A comparative study of public, private & foreign banks), 1st edn. Lulu Publication, USA
- Ahmadi E, Macassa G, Larsson J (2021) Managers' work and behaviour patterns in profitable growth SMEs. *Small Bus Econ*. 57(2):849–863. <https://doi.org/10.1007/s11187-020-00386-0>
- Andriessen D (2003) Making sense of intellectual capital. Taylor & Francis Ltd, New York, p. 440
- Armstrong M (2007) Řízení lidských zdrojů [Human resource management]. Grada Publishing, Praha, p. 789
- Armstrong M, Taylor S (2014) Armstrong's handbook of human resource management practice, 13th edn. Kogan Page Publishers, USA
- Aust I, Ehner I, Harry W, Zink K (2014) Sustainability and human resource management—developing sustainable business organizations. Springer, Nemecko, p. 442
- Bai FP, Shang MT, Huang YJ, Liu DH (2023) Digital investment, intellectual capital and enterprise value: evidence from China. *J Intellect Cap*. 25(1):210–232. <https://doi.org/10.1108/JIC-07-2022-0149>
- Becker GS (1964) Human capital. University of Chicago Press, Chicago
- Becker GS (1993) Human capital—a theoretical and empirical analysis, with special reference to education, 3rd edn. The University of Chicago Press, Ltd., Chicago, London, p. 412
- Blaga P, Gabor MR, Matis C (2021) The analysis of the efficiency of e-learning training program in pharmaceutical industry. A Romanian study case. *Qual—Access Success* 22(181):18–25
- Blštáková J, Joniaková Z, Jankelová N, Stachová K, Stacho Z (2020) Reflection of digitalization on business values: the results of examining values of people management in a Digital Age. *Sustainability* 12(12):5202
- Boateng P, Olexová C (2023) Enhancing organisational agility by means of agile complexity leadership. *J Hum Resour Manag—HR Adv Dev*. 26(2):135–143. <https://doi.org/10.46287/IXXV8743>
- Bontis N (2001) Assessing knowledge assets: a review of the models used to measure intellectual capital. *IJMR* 3(1):41–60. <https://doi.org/10.1111/1468-2370.00053>
- Bontis N, Dragonetti NC, Jacobsen K, Roos G (1999) The knowledge toolbox: a review of tools available to measure and manage intangible resources. *Eur Manag J*. 17(4):391–402
- Bontis N, Fitz-Enz J (2002) Intellectual capital ROI: a causal map of Human Capital Antecedents and Consequents. *J Intellect Cap*. 3(3):223–247
- Botella-Carrubi D, Gil-Gomez H, Oltra-Badenes R, Jabaloyes-Vivas JM (2021) Employer branding factors as promoters of the dimensions of employee organizational commitment. *Econ Res-Ekon Istraz* 34(1):1836–1849
- Bublyk M, Kopach T, Pikhniak T (2021) Analysis of human-capital development tools in insurance companies. *Econ Ecol Soci um* 5(2):40–48. <https://doi.org/10.31520/2616-7107/2021.5.2-5>
- Bulinska-Stangrecka H, Bagińska A (2021) The impact of employee training and development on tacit knowledge transfer and the mediating role of trust. *Int J Learn Change* 13(4-5):474–489
- Cam I, Özer G (2022) Intellectual capital and firm value: an investigation of Turkish manufacturing companies. *Istanbul Bus Res*. 51(1):257–277. <https://doi.org/10.26650/ibr.2022.51.879113>
- Cameron R, Herrmann H, Nankervis A (2024) Mapping the evolution of algorithmic HRM (AHRM): a multidisciplinary synthesis. *Humanit Soc Sci Commun* 11:303. <https://doi.org/10.1057/s41599-024-02786-z>
- Chalastra M, Kotapski R, Kozubíková Z, Kozubík A (2019) Human capital from the viewpoint of creating company value. Challenges for financial controllers. *Nauk Zarz = Manag Sci*. 24(3):3–9. <https://doi.org/10.15611/ms.2019.3.01>
- Chen HZ, Rahman MJ (2023) Intellectual capital and financial performance: evidence from Chinese retail firms. *Int J Learn Intellect Cap*. 20(4):394–409. <https://doi.org/10.1504/IJLIC.2023.132171>
- Chhaohcharia V, Ghosh S, Vishwasrao S (2024) Property rights and human capital investment. *J Econ Behav Organ* 217:11–31. <https://doi.org/10.1016/j.jebo.2023.10.034>
- Chodasová Z, Tekulová Z, Králik M (2016) Importance of management accounting knowledge in decision making. In: Slavičková P (ed) Proceeding of the international scientific conference on knowledge for market use 2016—our interconnected and divided world, Olomouc, Czech Republic. Palacky University in Olomouc, pp. 162–167
- Contini G, Peruzzini M (2022) Sustainability and Industry 4.0: definition of a set of key performance indicators for manufacturing companies. *Sustainability* 14(17):11004. <https://doi.org/10.3390/su141711004>
- Da Silva AFC, Jardon CMF (2019) Measuring the effect of human capital as a source of value in the wood sector of Galiza and Portugal (2002–2017). *Estud Econ Apl*. 37(3):230–239
- Dadd D, Hinton M (2022) Performance measurement and evaluation: applying return on investment (ROI) to human capital investments. *Int J Product Perform Manag* 72(9):2736–2764. <https://doi.org/10.1108/IJPPM-10-2021-0573>
- Dar IA, Mishra M (2021) Human capital and SMEs internationalization: development and validation of a measurement scale. *Glob Bus Rev*. 22(3):718–734. <https://doi.org/10.1177/0972150918817390>
- Davenport TH, Prusak L (2000) Working knowledge: how organizations manage what they know. HBS Press, Cambridge, p. 224
- De la Cruz Prego F (2021) Human capital and industrialization in Bolivia. *J Gov Econ*. 3:100017
- Dusek R (2021) Generic competency model: business graduate key competencies for successful working at trading companies—case study from the Czech Republic. *Glob Bus Financ Rev*. 26(4):65–76
- Edvinsson L, Malone MS (1997) Intellectual capital: realizing your company's true value by finding its hidden roots. Harper Collins Publishers, New York, p. 240
- Enström J (2020) Qualitative aspects of communication and relations between the actors in a supply chain for forest fuel. In: 2020 IEEE International conference on industrial engineering and engineering management. pp. 842–846. <https://doi.org/10.1109/ieem45057.2020.9309839>
- EPPP—European Public Policy Partnership (2016) Vzdelávací model pre výučbu riadenia ľudského kapitálu vo verejnom sektore [Educational model for teaching human capital management in the public sector]. http://www.jeneweingroup.com/dokumenty/eppp/Vzdelavaci_modul.pdf. Accessed 13 Jul 2023
- Evans G (2007) ROI: measuring the contribution of Human capital. Network Spring, pp. 33–35
- Fitz-enz J (2009) The ROI of human capital: measuring the economic value of employee. Amacom, New York, p. 336

- Grivalská I (2016) Návrh opatrení na zvýšenie efektívnosti ľudského kapitálu vo vybranom podniku. Diploma thesis, Faculty of Management and Informatics, University of Žilina in Žilina. 123 pp
- Gruenbichler R, Klucka J, Haviernikova K, Strelcova S (2021) Business performance management in small and medium-sized enterprises in the Slovak Republic: an integrated three-phase-framework for implementation. *J Compet*. 13(1):42–58. <https://doi.org/10.7441/joc.2021.01.03>
- Guo XG, Chen X (2023) The impact of digital transformation on manufacturing-enterprise innovation: empirical evidence from China. *Sustainability* 15(4):3124. <https://doi.org/10.3390/su15043124>
- Han Y, Zhou Y, Carr S, Jiang J(2024) Lifelong learning in the workplace: the knowledge management role of corporate universities in China *Humanit Soc Sci Commun* 11:189
- Hassan S, Muda M, Rahman RA, AedAlasadi HA, Yaghoubi H (2015) Enhancement of governance model for sustainable micro business of women entrepreneurs. In: 2015 SSR international conference on social sciences information. *Adv Soc Behav Sci*. 10:81–86
- Hasnaoui JA, Rizvi SKA, Reddy K, Mirza N, Naqvi B (2021) Human capital efficiency, performance, market, and volatility timing of Asian equity funds during COVID-19 outbreak. *J Asset Manag* 22. <https://doi.org/10.1057/s41260-021-00228-y>
- HCM Institute (2023) HCMi—workforce intelligence & management solutions. <https://www.hcmi.co>. Accessed 14 Jul 2023
- Hitka M, Hajdukova A, Balazova Z (2014) Impact of economic crisis on changes in motivation of employees in woodworking industry. *Drv Ind*. 65(1):21–26. <https://doi.org/10.5552/drind.2014.1303>
- Hitka M, Schmidová J, Lorincová S, Starchon P, Weberová D, Kämpf R (2021) Sustainability of human resource management processes through employee motivation and job satisfaction. *Acta Polytech Hung* 18(2):7–26. <https://doi.org/10.12700/APH.18.2.2021.2.1>
- Holubcik M, Soviar J, Lendel V (2023) Investigation of distinguished approaches towards synergy. *Entrep Sustain Issues* 10(4):293–306. [https://doi.org/10.9770/jesi.2023.10.4\(18\)](https://doi.org/10.9770/jesi.2023.10.4(18))
- Hryvkivska S, Polishchuk N, Salkova I, Kucher L (2019) Human capital in the formation of efficiency of enterprises activity. *Eur J Sustain Dev*. 8(3):499–509. <https://doi.org/10.14207/ejsd.2019.v8n3p499>
- Ingham J (2007) Strategic human capital management. Routledge, 400 pp
- Ionescu RV, Zlati ML, Antohi VM, Stanciu S, Virlanuta FO, Serban C (2020) New agricultural model of economic sustainability for wheat seed production in Romania. *Sustainability* 12(10):4182. <https://doi.org/10.3390/su12104182>
- Janosova P, Tokarcikova E (2021) Management of sustainability, its measurement and relevance in the company. *Hradec Econ Days* 11(1):287–296. <https://doi.org/10.36689/uhk/hed/2021-01-029>
- Kaliyeva DS, Baisalova B, Nathan J (2022) Managing formation of competitive human capital in project-oriented companies. *J East Eur Cent Asian Res*. 9(6):992–1007. <https://doi.org/10.15549/jecar.v9i6.950>
- Kämpf R, Lorincová S, Kapustina LM, Ližbetinová L (2017) Motivation level and its comparison between senior managers and blue-collar workers in small and medium-sized transport enterprises. *Communications* 19(4):43–49. <https://doi.org/10.26552/com.C.2017.4.43-49>
- Kearns P (2005) Human capital management. Reed Business Information, Sutton, Surrey
- Kislingerová E et al. (2010) Manažerské finance [Managerial finance], 3rd edn. C.H. Beck, Praha, p. 864
- Klučka J, Kelišek A, Strelcová S, Grünbichler R (2022) Hodnotenie výkonnosti malých a stredných podnikov (na Slovensku a v Rakúsku). EDIS, Žilina
- Kohnová L, Papula J, Papulová Z, Stachová K, Stacho Z (2020) Job mismatch: the phenomenon of overskilled employees as a result of poor managerial competences. *Entrep Sustain Issues* 8(1):83–102. [https://doi.org/10.9770/jesi.2020.8.1\(6\)](https://doi.org/10.9770/jesi.2020.8.1(6))
- Koman G, Toman D, Jankal R, Borsos P (2023) Risk management in a human resources information system. *Entrep Sustain Issues* 11(1):331–352. [https://doi.org/10.9770/jesi.2023.11.1\(20\)](https://doi.org/10.9770/jesi.2023.11.1(20))
- Koman G, Tumova D, Jankal R, Miciak M (2022) Business-making supported via the application of big data to achieve economic sustainability. *Entrep Sustain Issues* 9(4):336–358. [https://doi.org/10.9770/jesi.2022.9.4\(18\)](https://doi.org/10.9770/jesi.2022.9.4(18))
- Kotkova B, Hromada M (2021) The threat of social engineering and the safety of companies. In: IEEE 25th International conference on circuits, systems, communications and computers. pp. 126–133. <https://doi.org/10.1109/CSCC53858.2021.00030>
- Koziol L, Koziol W, Wojtowicz A, Pyrek R (2014) An outline of a compensation system based on human capital theory. *Procedia—Soc Behav Sci*. 148:551–558. <https://doi.org/10.1016/j.sbspro.2014.07.078>
- Koziol W (2018) The concept of measurement and reporting of human capital. In: 18th Annual conference on finance and accounting. Impact of globalization on international finance and accounting, Prague, Czech Republic, Springer, pp. 311–318
- Kucharcikova A, Konusikova L, Tokarcikova E (2016) Approaches to the quantification of the human capital efficiency in the enterprises. *Communications* 1A/2016:49–54. <https://doi.org/10.26552/com.C.2016.1A.49-54>
- Laporsek S, Dolenc P, Grum A, Stubelj I (2021) Ownership structure and firm performance—the case of Slovenia. *Econ Res-Ekon Istraz* 34(1):2975–2996. <https://doi.org/10.1080/1331677X.2020.1865827>
- Lee CH, Yeh W, Yu Z, Luo Y(2023) Knowledge sharing and innovation performance: a case study on the impact of organizational culture, structural capital, human resource management practices, and relational capital of real estate agents *Humanit Soc Sci Commun* 10:707. <https://doi.org/10.1057/s41599-023-02185-w>
- Lin SH, Weng YH (2019) Market size, productivity and product quality regarding firm heterogeneity. *Econ Res-Ekon Istraz* 32(1):2918–2934
- Ližbetinová L, Nedeliaková E, Sousek R, Greguš M (2020a) Keeping talents in the transport and logistics companies: case study from the Czech Republic. *Acta Polytech Hung* 17(9):199–219. <https://doi.org/10.1080/1331677X.2019.1653781>
- Ližbetinová L, Štarchoň P, Weberová D, Nedeliaková E, Juříková M (2020b) The approach of SMEs to using the customer databases and CRM: empirical study in the Slovak Republic. *Sustainability* 12(1):227. <https://doi.org/10.3390/su12010227>
- Lorincová S, Schmidová J, Javorčíková J (2016) Employee job satisfaction in furniture manufacturing companies in the Slovak Republic. *Drv Ind*. 67(4):351–362. <https://doi.org/10.5552/drind.2016.1614>
- Lorincová S, Schmidová J, Javorčíková J (2018) The impact of the working position on the level of employee motivation in Slovak furniture companies. *Acta Facultatis Xylogiae Zvolen* 60(2):211–223. <https://doi.org/10.17423/afx.2018.60.2.20>
- Lubacha J (2023) The role of regional intangible assets for the innovation activity of enterprises: the case of Pol Reg *J Knowl Econ* <https://doi.org/10.1007/s13132-023-01127-w>
- Lusena-Ezera I, Liduma D (2018) Teamwork in manufacturing enterprise performance achievement. In: 10th International scientific conference on business and management, business and management-Spausdinta. pp. 111–120. <https://doi.org/10.3846/bm.2018.13>
- Malichová E, Mičiak M (2022) The comparison of managers' decision-making on investment processes in IT and industrial enterprises. *Innov Manag Educ Excell Vis*. 2020 I–XI:4999–5009. https://www.researchgate.net/publication/328759915_The_Comparison_of_Managers%27_Decision-Making_on_Investment_Processes_in_IT_and_Industrial_Enterprises
- Mankiw NG, Romer D, Weil DN (1992) A contribution to the empirics of economic growth. *Q J Econ*. 107:407–437. https://eml.berkeley.edu/~dromer/papers/MRW_QJE1992.pdf
- Manuti A, de Palma PD (2014) Why Hunam capital is important for organizations. Palgrave MacMillan, USA, p. 228
- Marimuthu M, Arokiasamy L, Ismail M (2009) Human capital development and its impact on firm performance: evidence from developmental economics. *J Int Soc Res*. 2(8):265–272. https://www.researchgate.net/publication/26628217_Human_Capital_Development_and_Its_Impact_on_Firm_Performance_Evidence_from_Developmental_Economics
- Marr B (2012) Key performance indicators (KPI): the 75 measures every manager needs to know. FT Press, Harlow, p. 376
- Mayo A (2001) The human value of the enterprise. Nicholas Brealey Publishing, London, p. 328
- Mehrfar Y, Abasi M, Samimi K, Hanifi SM, Pouyaktion M (2023) Determination of key safety performance indicators using Delphi method: a case study on electricity distribution company in Alborz Province. *J Health Saf Work* 13(2):289–308. 2383–2088
- Meizary A, Sumantoro IB, Yohanson AK (2023) Human capital value added & human capital return on investment with approach JAC Fitz-enz at BPJS employment HR. *J Ekon* 12(3):454–461. <https://ejournal.seaninstitute.or.id/index.php/Ekonomi/article/view/1954>
- Monroy SRC, Suárez LP (2018) Human talent and environmental care in the hotel industry. *Anu Tur Soc*. 23:85–100. <https://doi.org/10.18601/01207555.n23.05>
- Mubarik MS, Chandran VGR, Devadason ES (2018) Measuring human capital in small and medium manufacturing enterprises: what matters? *Soc Indic Res*. 137:605–623. <https://doi.org/10.1007/s11205-017-1601-9>
- Mubarik M, Devadason E, Govindaraju C (2020) Human capital and export performance of small and medium companies in Pakistan. *Int J Soc Econ* 47(5):643–662. <https://doi.org/10.1108/IJSE-03-2019-0198>
- Ni D, Zheng XM, Liang LH (2021) Rethinking the role of team mindfulness in team relationship conflict: a conflict management perspective. *J Organ Behav* 43(5):878–891. <https://doi.org/10.1002/job.2588>
- Nikitochkina YV (2021) Corporate human capital management in the context of generational theory. *Terra Econ*. 19(1):138–151. <https://doi.org/10.18522/2073-6606-2021-19-1-138-151>
- Ogbeyemi A, Lin WJ, Zhang F, Zhang WJ (2020) Human factors among workers in a small manufacturing enterprise: a case study. *Entrep Inf Syst*. 15(6):888–908. <https://doi.org/10.1080/17517575.2020.1829076>
- Oladimeji KA, Abdulkareem AK, Ishola AA (2023) Talent management, organizational culture and employee productivity: the moderating effect of

- employee involvement. *J Hum Resour Manag—HR Adv Dev.* 26(1):43–56. <https://doi.org/10.46287/DPKF9953>
- Oyinlola MA, Adedeji AA, Onitekun O (2021) Human capital, innovation, and inclusive growth in sub-Saharan African Region. *Econ Anal Policy* 72:609–625. <https://doi.org/10.1016/j.eap.2021.10.003>
- Pavlova VA, Khavrova KS (2020) Intellectualization management systems of trade enterprises activities. *Acad Rev.* 1:50–59. <https://doi.org/10.32342/2074-5354-2020-1-52-5>
- Perera A, Thrikawala S (2012) Impact of human capital investment on firm financial performances: an empirical study of companies in Sri Lanka. *IPDR* 54(3):11–16. <https://doi.org/10.7763/IPEDR>
- Pirogova O, Voronova O, Khnykina T, Plotnikov V (2020) Intellectual capital of a trading company: comprehensive analysis based on reporting. *Sustainability*, 12(17). <https://doi.org/10.3390/su12177095>
- Pitra Z (2008) Podnikový management. [Business management]. ASPI, Praha, p. 295
- Plotnikova LI, Romanenko MV (2019) Creative methods of innovation process management as the law of competitiveness. *Manag Sci Lett.* 9(5):737–748. <https://doi.org/10.5267/j.msl.2019.1.015>
- Podhorcová J, Ďurian J, Kmecová I (2023) Human capital management in the Industrial Revolution 4.0. *J Hum Resour Manag—HR Adv Dev.* 26(1):57–67. <https://doi.org/10.46287/KVJ18339>
- Polcyn J (2021) Eco-efficiency and human capital efficiency: example of small- and medium-sized family farms in selected European countries. *Sustainability* 13(12):6846. <https://doi.org/10.3390/su13126846>
- PwC (2023) People analytics. <https://www.pwc.com/us/en/services/consulting/business-transformation/workforce-transformation.html>. Accessed 14 Jun 2023
- Safonov V, Borshch V, Danylko M (2023) Human capital assessment methodology. *Balt J Econ Stud.* 9(3):179–184. <https://doi.org/10.30525/2256-0742/2023-9-3-179-184>
- Šafránková JM, Šikýř M (2018) Responsibilities and competencies in personnel management at Czech schools. *Oecon Copernic* 9(3):529–543. <https://doi.org/10.24136/oc.2018.027>
- Samson K, Bhanugopan R (2022) Strategic human capital analytics and organisation performance: the mediating effects of managerial decision-making. *J Bus Res.* 14:637–649. <https://doi.org/10.1016/j.jbusres.2022.01.044>
- Shafiee MM, Warkentin M, Motamed S (2023) Do human capital and relational capital influence knowledge-intensive firm competitiveness? The roles of export orientation and marketing knowledge capability. *J Knowl Manag* 28(1):138–160. <https://doi.org/10.1108/JKM-11-2022-0921>
- Shen B (2020) Construction of performance evaluation system of human resource management in port foreign trade enterprises. *J Coast Res Issue* 103:217–221. <https://doi.org/10.2112/SI103-047.1>
- Shou T (2022) A literature review on the net present value (NPV) valuation method. In: Conference ICEMED 2022, advances in economics, business and management, vol. 656. Atlantis Press. <https://doi.org/10.2991/aebmr.k.220603.135>
- Šikýř M, Šafránková JM (2018) Human capital management at Czech Schools. In: Proceedings paper: Reproduction of Human Capital—Mutual Links and Connections (RELIC 2018). pp. 354–363
- Šoljaková L, Fibírová J (2010) Reporting. GRADA, Praha, p. 221
- Stacho Z, Stachová K, Cagaňová D, Blštáková J (2021) The key managerial competencies tendencies application in the business environment in Slovakia within the context of Industry 4.0. *EAI Endorsed Trans Energy Web* 8(32):1–9. <https://doi.org/10.4108/eai.1-7-2020.166009>
- Sveiby KE (1997) The new organizational wealth: managing and measuring knowledge based assets. Barlett-Kohler Publishers, San Francisco, p. 220
- Sveiby KE (1998) Measuring intangibles and intellectual capital—an emerging first standard. 11 pp
- Terai K (2023) Investment in human capital by a shareholder. *Appl Econ.* <https://doi.org/10.1080/00036846.2023.2276077>
- Terán-Yépez E, Marín-Carrillo GM, Casado-Belmonte MDP, Capobianco-Uriate MDLM (2020) Sustainable entrepreneurship: review of its evolution and new trends. *J Clean Prod* 252:119742. <https://doi.org/10.1016/j.jclepro.2019.119742>
- Timothy VL (2022) The effect of top managers' human capital on SME productivity: the mediating role of innovation. *Heliyon* 8(4). <https://doi.org/10.1016/j.heliyon.2022.e09330>
- Tokarcikova E, Ponisciakova O, Bartosova V (2016) Assessment of the credibility of key business clients. *Procedia—Econ Financ* 39:612–619. [https://doi.org/10.1016/S2212-5671\(16\)30306-9](https://doi.org/10.1016/S2212-5671(16)30306-9)
- Tokarcikova E, Ponisciakova O, Litvaj I (2014) Key performance indicators and their exploitation in decision making process. In: 18th International conference on transport means. Kaunas University of Technology, Lithuania, pp. 372–375
- Vergara-Romero A, Márquez Sánchez F, Sorhegui-Ortega R, Olalla-Hernández A (2021) Human capital: central actor for organizational sustainability. *Rev Venez Gerenc* 26(93):297–307. <https://doi.org/10.37960/rvg.v26i93.34984>
- Veselinovic N, Krstic B, Veselinovic M (2021) Measuring the efficiency of human capital. *Econ Sustain Dev.* 5(2). <https://doi.org/10.5937/ESD2102001V>
- Veselinović N, Krstić B, Radenović T (2022) The impact of human capital value on human capital efficiency and business performance. *Facta Univ Econ Organ* 19(1):13–26. <https://doi.org/10.22190/FUEO211118002V>
- Vila SA, Perez CT, Garcia AM (2023) Talent management balanced scorecard model. A service company case study. *Methadod-Rev Cienc Soc.* 11(2). <https://doi.org/10.17502/mrcs.v11i2.654>
- Vithana K, Jayasekera R, Choudhry T, Baruch Y (2023) Human capital resource as cost or investment: a market-based analysis. *Int J Hum Resource Manag* 34(6). <https://doi.org/10.1080/09585192.2021.1986106>
- Vorobyov N (2020) Review of research on human capital development. *Rev Res Hum Cap Dev.* 35(2). <https://doi.org/10.24923/2222-243X.2020-35.1>
- Voronkova O, Semenova Y, Panova AY, Ostrovskaya EN, Gribanovskaya SV (2020) Improvement of the human capital management methods. *Rev Inclusiones* 7:541–550. <https://revistainclusiones.org/index.php/inclu/article/view/1183>
- Weqar F, Haque SMI, Imamul SM (2022) The influence of intellectual capital on Indian firms' financial performance. *Int J Learn Intellect Cap.* 19(2):169–188. <https://doi.org/10.1504/IJLIC.2021.10039514>
- Wijaya A (2021) Conventional financial performance, economic value added, human economic value added, value added intellectual coefficient and its impact on stock return of companies operating in energy sector in Indonesia and Malaysia. *Ilomata Int J Tax Account* 2(3):222–235. <https://doi.org/10.52728/ijtc.v2i3.286>
- Wirasedana IWP, Sudarma M, Andayani W, Mulawarman AD (2024) The role of capital in microfinance financial performance and cultural sustainability. *Cogent Bus Manag* 11(1):2287770. <https://doi.org/10.1080/23311975.2023.2287770>
- Wisawapaisarn O, Yodmongkol P (2021) Human capital in a training programme. *Int J Learn Intellect Cap.* 18(2):113–130. <https://doi.org/10.1504/IJLIC.2020.10031781>
- Wyatt W (2001) Watson Wyatt's human capital index: human capital as a lead indicator of shareholder value: 2001/2002 survey report. Watson Wyatt Worldwide, p. 12
- Yang GJ, Wang F, Huang XH, Chen HY (2022) Human capital inflow, firm innovation and patent mix. *J Asian Econ.* 79:101439. <https://doi.org/10.1016/j.asieco.2021.101439>
- Yang HL (2020) Human resource management and labor relationship adjustment mechanism of port freight trade enterprises. *J Coast Res Issue* 103:629–633. <https://doi.org/10.2112/SI103-128.1>
- Yao-Ping Peng M, Zhang L, Lee MH, Hsu FY, He Y (2024) The relationship between strategic human resource management, green innovation and environmental performance: a moderated-mediation model *Humanit Soc Sci Commun* 11:239. <https://doi.org/10.1057/s41599-024-02754-7>
- Zaimon S, Ismail RF, Ahmad RAR, Shafi RM, Misman FN, Nawi SM, Kadir JMA (2020) Factors of human resource management practices affecting organizational performance. *Int J Organ Leadersh* 9(4):184–197. <https://doi.org/10.33844/ijol.2020.60505>
- Zalai K, Kalafutová L, Šnircová J (2004) Finančno-ekonomická analýza podniku. Sprint, Bratislava, p. 482
- Zane LJ (2022) Intellectual capital and the acquisition of human capital by technology-based new ventures. *J Intellect Cap.* 24(3):7800–798. <https://doi.org/10.1108/JIC-04-2021-0122>

Acknowledgements

This research was supported by the Scientific grant agency of the Ministry of Education, Science, Research and Sports of the Slovak Republic and the Slovak Academy of Sciences under grant number: VEGA 1/0273/22: Resource efficiency and value creation for economic entities in the sharing economy, by Slovak Research and Development Agency under grant number: APVV-20-0004, by Cultural and Educational Grant Agency of the Ministry of Education, Science, Research and Sport of the Slovak Republic under grant number: KEGA 012UCM-4/2022.

Author contributions

Conceptualization: AK and MD; methodology: NS; validation: NS; formal analysis: AK; investigation: MD and AK; resources: MD and AK; data curation: NS; writing—original draft preparation: AK, MD; writing—review and editing: NS; visualization: NS; project administration: NS; funding acquisition: MD, AK, NS. All authors have read and agreed to the published version of the manuscript.

Competing interests

The authors declare no competing interests.

Ethical approval

This article does not contain any studies with human participants conducted by any of the authors. The article was prepared in accordance with the Code of Ethics of the University of Žilina (Guideline No. 207), which is available at https://www.uniza.sk/images/pdf/uradnatabula/smernice-predpisy/2024/03062024_S-207-2021-Etický-kodex-UNIZA-v-zneni-Dodatku-c-1.pdf and with Directive no. 226, which regulates author ethics and plagiarism at the University of Žilina (available at: <https://www.uniza.sk/images/pdf/kvalita/2021/smernica-UNIZA-c-226.pdf>). Since no points in both directives require a meeting of the Ethics Commission of the University of Žilina in the case of research that does not involve human participants, this commission was not convened in the case of the presented article.

Informed consent

This article does not include studies with human participants that have been conducted by some of the authors. Company data used in the manuscript was obtained from published financial statements and annual reports on the Internet. A declaration of informed consent was not required, as no research in the form of questionnaires, interviews or experiments was carried out within the study.

Additional information

Correspondence and requests for materials should be addressed to Nikola Staffenova.

Reprints and permission information is available at <http://www.nature.com/reprints>

Publisher's note Springer Nature remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.



Open Access This article is licensed under a Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International License, which permits any non-commercial use, sharing, distribution and reproduction in any medium or format, as long as you give appropriate credit to the original author(s) and the source, provide a link to the Creative Commons licence, and indicate if you modified the licensed material. You do not have permission under this licence to share adapted material derived from this article or parts of it. The images or other third party material in this article are included in the article's Creative Commons licence, unless indicated otherwise in a credit line to the material. If material is not included in the article's Creative Commons licence and your intended use is not permitted by statutory regulation or exceeds the permitted use, you will need to obtain permission directly from the copyright holder. To view a copy of this licence, visit <http://creativecommons.org/licenses/by-nc-nd/4.0/>.

© The Author(s) 2024

Alzbeta Kucharcikova¹, Maria Durisova¹ & Nikola Staffenova²  

¹Department of Macro and Microeconomics, Faculty of Management Science and Informatics, University of Žilina, Univerzitna 8215/1, 010 26 Zilina, Slovakia. ²Department of Managerial Theories, Faculty of Management Science and Informatics, University of Žilina, Univerzitna 8215/1, 010 26 Zilina, Slovakia. ✉email: nikola.staffenova@fri.uniza.sk