

Review Paper

Methodological Evaluation of Human Capital in the Digital Economy

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ABSTRACT

The purpose of this paper is to analyse methodological approaches to form human capital in a way to improve them. Among the methods used were the analytical method, the functional method, the systematic analysis method, the deduction method, the comparison method and the synthesis method. The authors identified the parameters affecting human capital and the main areas for improvement and staff development in the context of digitalisation. They provided the recommendations on the choice of qualitative assessment methods and on the challenges of human capital development in the digital economy. The researchers defined the essence and the directions of overcoming human capital dysfunction when ensuring effective development of intellectual capital in the digital economy. They pointed out the importance of human capital in the development of modern economic relations and the direction of technological development in the economy. The authors identified the advantages and the disadvantages of existing methodologies for the measurement of human capital in the functioning and development of the modern economy.

HIGHLIGHTS

- The article aims to analyze methodological approaches for improving human capital in the context of the digital economy, identifying parameters and areas for development, providing recommendations, and addressing the challenges of human capital assessment and development, emphasizing its importance in modern economic relations and technological development.

Keywords: Competitiveness, Digitalisation, Economic Development, Intellectual Capital, Work Resources

One of the key sources of economic growth is human capital. Investment into human capital often produces a greater economic effect than investment in real capital, making it the main driver of development, which secures its leading role in the economic system. Rapid advances in the information technology have led to a variety of approaches to understanding 'human capital'.

The authors S. Abasova and G. Mikayilzade (2020) noted that human capital is a complex socio-economic category, defined by both quantitative and qualitative indicators. The scholar L. Zeynalli

(2021) emphasises that human development is the basis for the creation of human capital, which in turn determines the competitiveness of a country. Ensuring sustainable growth and reducing economic, social, environmental and political risks depend on the development of human capital, achievable through education, skills development and public awareness.

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The researchers Y. Hasanli *et al.* (2020) believe that today's innovative industrial companies face the increasing importance of knowledge in the production process, leading to the emergence of human capital as an important resource for economic growth. New knowledge is a strategically important resource for industrial companies because it increases their market value and competitiveness. In recent years, the importance of human capital in the creation of industrial products and the provision of services has increased considerably.

According to R.S. Azizova (2020), technological advances require a rethinking of production factors. While the capital and the labour were the key factors in the traditional production model, the new model adds technology and knowledge. The degree to which an economy is knowledge-based depends on the extent to which people in society and those employed in the economy have this knowledge.

In the opinion of A. Jaouani *et al.* (2020), human capital is of particular importance in most developing countries as driving force of economic progress. If governments do not improve the quality of the workforce, achieving long-term economic efficiency will become difficult. A country's global competitiveness depends on its progress of innovation and knowledge. Human capital consists of the set of competencies, knowledge and personal qualities needed to perform work and to create economic value.

The aim of this study is to establish a theoretical framework and to develop targeted recommendations for improving the methods and organisational aspects of human capital assessment in the digital economy. The implementation of this objective will help to develop an effective and high-quality human capital assessment process and reduce the likelihood of errors in the future management.

MATERIALS AND METHODS

The research study on the current problems of human capital evaluation in the digital economy used the methods that reveal both theoretical and practical content of the object. The paper has included the study of academic articles, thesis materials and academic opinion in the economic field. The analytical method analysed statistics on employment and unemployment in various sectors

of the digital economy, identified problems and trends in the assessment of human capital in the digital economy and assessed data on qualification requirements for workers in the digital economy.

The functional method helped to analyse the role and nature of government programmes and policies in providing access to education and supporting human capital development in the digital economy. The systems analysis method has enabled an assessment of each element and factor separately to study its impact on human capital and to identify the connections and dependencies between them. Using deduction, the authors defined what competences and qualities are most important for assessing human capital and identified assessment methodologies that reflect the needs of the digital economy more accurately. The synthesis method helped to identify the associations between different aspects of human capital assessment in the digital economy and to define how different competencies and qualities affect the productivity and efficiency of the workers in the digital economy. The comparison method provided a comparative analysis of different methodologies for human capital assessment in the digital economy, comparison of different criteria for capital assessment, such as technical and social competences of the employees and comparison of results obtained by different assessment methodologies.

The study took place in certain sequence with some aspects revealed. First, the authors investigated theoretical component of the study. It provided an opportunity to analyse the concept of 'human capital' in more detail. This allowed the authors to observe its structure, formation factors and types. The following aspects are the essence, characteristics, development trends and impact on human capital of the digital economy. Next, the scholars explored the practical component. It consisted of exploring new technologies as well as models and methodologies for evaluating human capital, their classification, advantages and disadvantages and application in the digital economy. It included tools for measuring and managing human capital in the digital economy such as competency assessment, professional training and HR analytics. The other aspects are performance monitoring as well as strategies and approaches that can be effective for human capital development.

The final part is to consider the necessary recommendations in highlighting specific problems in the methodological assessment of human capital that will contribute to addressing the issues and development of the digital economy. As a result, the authors weighted the feasibility of implementing effective evaluation methods using new technologies and approaches and increased focus on social and ethical aspects for successful economic development.

RESULTS

Today's environment determines the development, whether at enterprise, regional or national level, not only by the perfection and by modernity of production means and technology but also by the level of intelligence, creativity, skills and abilities of people. Since the mid-twentieth century, human capital theory has now evolved and brought numerous approaches. Some economists focus on quantitative methods for assessing the cost-effectiveness of investments in the education, upbringing and health of people who are carriers of human capital. Other methods rely on differences in the income that people receive based on innate ability as influenced by heredity (Flores *et al.*, 2020).

The era of the digital economy imposes many new demands on the workers. They should not only have traditional skills and knowledge but also be able to work with digital technologies such as robotics, artificial intelligence and database skills. The companies have to conduct ongoing training and development to their employees to meet these new demands. However, at the same time, the digital economy may lead to a deterioration in the quality of human capital. For example, the spread of automation and robotics may result in job losses and a reduction of the demand in some professions (Banhidi *et al.* 2020).

The phenomenon of human capital consists of several components. Among them are intellectual capital, which determines the purpose of using human resources, educational capital, which in turn consists of general and professional qualification and education and health capital, ensuring the fullness and efficiency of creative activity. The most important components of human capital affecting economic output in a digital economy are

intellectual capital, educational capital and health capital (Lutz *et al.* 2014).

There are several basic methods for practical assessment of human capital in modern enterprises. The simple method of direct expense calculation of human resources costs allows an estimate of total economic cost spent by a company for its employees. A more accurate but complex method is the competitive evaluation of human capital, which takes into account the total costs and potential losses a company may incur if an employee leaves. The method estimating the value of future human capital contributes to the competitive evaluation and considers the changes in the value of human capital over a period of three years or more. The final method of assessment is the evaluation of human capital through testing in a real or purpose-built business environment for certain categories of employees. The performance-based evaluation is the most appropriate and optimal approach in the era of the digital economy as evaluation by the total number of formal achievements often leads to erroneous conclusions (Charlwood *et al.* 2017).

At present, the analysis of human capital and its components may involve the following main approaches: natural indicators, value indicators and relative indicators. Natural indicators have one of the main advantages, which is accessibility, as they can simply draw from statistical data. This approach envisions separate evaluation of each of the components of human capital as education, professional qualifications and health (Ahmadov, 2019). The value indicators are universal and demonstrate the structure of human capital in the digital economy more accurately. They provide an opportunity to compare different regions and social groups incomparable in other ways. This flexible and versatile approach allows the estimates and comparisons at the meso- and macro-levels. It also helps to measure not only individual costs and effects but also their aggregated values at different levels of the economic system. The cost estimates can serve for measuring not only personal but also societal, regional and corporate human capital, generated from any set of funding sources (Angrist *et al.* 2021).

A third approach often helps to compare between areas or groups, based on the calculation of various coefficients, ranks and other measures.

The most common measures in this approach are the following indicators: intellectual potential of a society, the level of education of the population, the human development index, the percentage of people employed in high-tech industries and many others (Bonner *et al.* 2023).

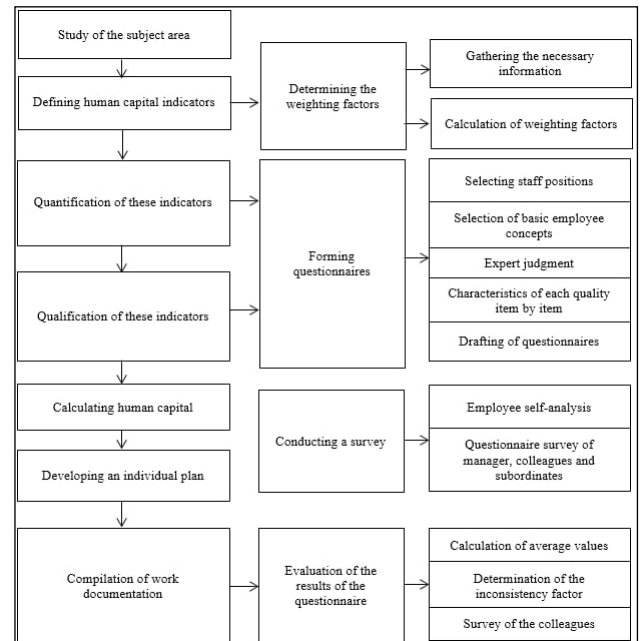
The objectives of the study should serve the choice of methods for assessing human capital. The income and cost approaches are frequent in estimating human capital in an enterprise and help to determine its value based on certain factors. It is important to apply an expert methodology that will assess qualitative characteristics such as creative thinking and staff expertise in addition to the above approaches. The era of the digital economy stipulates the use of a three-stage capital assessment (Faggian *et al.* 2019).

The first stage involves identifying key indicators that reflect the employee’s contribution to the company’s knowledge and experience. This requires identifying the directions of activity and the contribution that each employee makes to these areas. The assessment builds on a ranking of professionally important qualities of the employee applicable in the given areas of the enterprise. In today’s world, the professional qualities may include knowledge of computer technology and the ability to develop new scientific directions for a scientific organisation. Among other qualities are business communication, English language skills, project management, teamwork, business and presentation skills, analytical thinking and time management.

The second stage of the estimation process establishes the weighting factors for each of the indicators based on the frequency of their occurrence during the test of the employee. The use of weighting factors improves the objectivity of the methodology. Each of the listed qualities determines the corresponding rank of the tested employee, serving the primary assessment of professional qualities. The third step in the process is to create a point scale for each indicator and to analyse the results obtained for each employee. The best determination of the level of payment when drawing the employment contracts is an accurate estimate of individual and total human capital.

Assessing human capital is an important step and

requires a considerable amount of time to immerse in the subject area. The subsequent stages of analysis and employee questionnaires can be more accurate owing to the initial assessment. Figure 1 illustrates the steps in determining the initial human capital assessment.



Source: B.N. Isabekov and L.K. Mukhambetova (2019).

Fig. 1: Stages in conducting an initial assessment of human capital

The digital skills training is now becoming more common in standard training programmes for workers who will operate on numerically controlled machines. In addition, digital technologies are changing approaches to the study of humanity disciplines and require certain communication skills (interpersonal skills, verbal literacy, cognitive flexibility, client orientation, negotiation) (Sima *et al.* 2020).

DISCUSSION

The author A. Goldberg (2002) suggests the use of the Mercer human capital wheel model, which consists of six segments: “people” (capabilities and expertise), “structure” (hierarchy and organisation), “processes” (how work is organised), “decision-making”, “information flow” and “reward”. Each of these sectors on the wheel indicates the changes that have taken place over the previous three to five years. These changes demonstrate subsequent connection to productivity and quality

indicators, such as value added per worker or other measures of productivity. It is also possible to compare individual business units in terms of the relationship between their success and their position in the sectors on the wheel.

The authors R.H. Hamilton and W.A. Sodeman (2020) highlighted an expert method for assessing human capital in enterprise management system based on the Key Performance Indicator (KPI) system. KPI is a multi-criteria job evaluation method that uses objective measurements to assess the employees' achievements in line with the company's strategic and tactical goals. The performance assessment builds on real achievements, which makes this method more objective. A KPI system allows the specialist to track each employee's performance against key indicators that show how a particular employee or an entire department is moving towards achieving their goals during their day-to-day work.

The authors N. Veselinovic *et al.* (2022) in their research suggest a method that incorporates the approaches used to define economic value added (EVA). It consists of calculating the economic value added per unit of human capital in order to determine the efficiency of a company's use of human capital. In addition, the author justifies the need to determine the full cost of a company's human capital using the Human Capital Cost Factor (HCCF), which takes into account the costs of wages, benefits and social security of permanent employees.

The authors P. Guillaumont *et al.* (2017) suggest regarding the human capital as an economic category implemented through work activities. The authors distinguish four parameters that can influence the degree of efficiency of human capital and its value at the level of a particular region. These parameters include total Working Time (WT), current Level of Technological Development (LTD), established Level of Human Potential (LHP) and overall Productive Efficiency (PE). Each parameter undergoes quantitative measurement through a system of indicators, which together qualitatively adjust the value of the region's human capital at a given point in time.

T. Hilorme *et al.* (2020) argue that the aim of an organisation is to manage human capital

effectively to achieve greater productivity than if everyone worked individually. This requires creating the teams uniting the value of members and treating them as assets for comparison. This helps to determine the relative costs of teams, the distribution of capacity and areas where problems may arise. The analysis of the evaluation factors also helps to determine how the distribution of values occur across functions and areas, which may lead to the need to change the organisation's culture in accordance with the new values.

To compete in today's marketplace, the companies need to increase their human capital levels using not only traditional competitiveness factors such as natural resources and labour, but also technological, organisational and other knowledge and skills, introducing training programmes on the latest designs and developing a corporate culture and equipment.

CONCLUSION

The study identifies different approaches to the methodological assessment of human capital in the digital economy era. The authors identified the most important components of human capital that affect economic output and new demands on workers that have emerged with the digital economy. There are several basic methods for practical assessment of human capital in modern enterprises: a simple method of direct calculation of the cost of human resources, competitive human capital evaluation, prognostic human capital evaluation and human capital evaluation of the employees under tests.

The authors suggest three main approaches in analysing human capital and its components: natural indicators, value indicators and relative indicators. The study highlighted the importance of using an expert method to assess qualitative characteristics and recommended assessing human capital in several stages. In conclusion, the authors note that different approaches to the evaluation of human capital produce very different results, so it is probably not possible to develop a single objective methodology for evaluation.

It is therefore important to improve the quality of human capital assessment in the future in order to introduce effectively the various projects during technological implementations. The authors suggest

that people's education, professional qualifications and mental capacity become particularly significant in the industrial-innovative development and digitalisation of the economy. Further research will focus on developing methods for estimating human capital that consider similar influencing factors.

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