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Management of Human Resource Potential under Digital Transformation and Orientation Towards Sustainable Development

Abstract

The aim of the research is to systematize the features of human resource potential management under the influence of digital transformation and the implementation of sustainable development goals, as well as to define recommendations for enhancing the efficiency of this process. *Methodology.* The methodological basis of the study includes: a comprehensive approach, which considers the primary components of the development of the examined process both at present and in the future; comparative analysis, which enables a comparison of scientists' views on the studied issues; and content analysis, through which key terms characterizing the use of various approaches to human resource potential management within the context of sustainable development and digital transformation were identified. *Results.* The main directions of managing the human resource potential of enterprises under digitalization and sustainable development goals were developed and characterized, including: (1) the intellectual direction of integrating digital technologies into the processes of managing human resource potential; (2) the performance-oriented direction of implementing digital technologies in managing human resource potential; and (3) the competitive direction of integrating digital technologies into the processes of managing human resource potential of enterprises. In this work, recommendations for improving human resource potential management are formulated and substantiated. These recommendations include: implementing an approach to maintain motivation within the workforce to ensure continuous digital learning and self-improvement, not only in their primary specialization but also in complementary skills that may become essential for them in the future; incentivizing mentorship within the work collective, encouraging experienced and proactive specialists to engage in the adaptation of new employees to work with digital technologies, thus contributing to the achievement of sustainable development goals; and developing strategic management models for adapting human resource potential to digital transformations and the enterprise's pursuit of sustainable development objectives. *Practical implications.* The practical value of the research results lies in their potential application by enterprises that are implementing new approaches in the human resources domain within the context of digital transformation and the shift towards sustainable development. *Value / Originality.* The scientific novelty of the presented study lies in the development of theoretical and methodological support for human resource potential management under the influence of digital transformation and the pursuit of sustainable development goals.

1 Introduction

Digitalization has introduced components such as advanced technologies, artificial intelligence tools, the intellectualization of key management processes, innovations, production automation, and more. Digital transformation has been accompanied by a parallel trend in countries, companies, and society toward achieving the sustainable development goals outlined in the UN's programmatic foundations. Researchers and specialists link the advent of digitalization with the development of the Fourth Industrial Revolution (or Industry 4.0), where society and the economy are focused on the adoption of digital technologies across economic and essential life sectors (Suleiman et al., 2022). This process has been marked by the rapid implementation of digital technologies in various industries and management areas, with a significant share of functions being assigned to robotic systems. This shift has gradually raised potential threats to human capital, leading to unemployment in enterprises that chose to transfer repetitive or highly precise tasks to robots. Companies, which are the foundation of national economies, have not always taken on obligations in the field of corporate social responsibility, particularly in balancing social and economic dimensions. The focus was often on the interests of investors seeking profit growth or on leadership aiming for rapid improvements in the quality of high-tech production, largely achieved through the use of innovative digital technologies.

The concept of sustainable development promoted by the UN includes 17 programmatic goals, 6 of which focus on supporting the social sphere and ensuring quality conditions for the development of human capital. Most countries are gradually adapting these goals to their national development strategies; economically developed and socially oriented nations demonstrate significant progress in their implementation, both at the state level and across economic sectors, enterprises, and other areas. Business entities recognize the need to adhere to these goals, as doing so promotes better integration into international markets (especially when a company declares and fulfills commitments to corporate social responsibility based on sustainable development goals). Manifestations of combining technological growth with the socially oriented development of enterprises contribute to their transition toward the Industry 5.0 concept, which is only beginning to spread at the national and company levels. Its key principles are oriented toward the humanization of digital transformations in the economy, balancing current and future needs of human resources and society, and emphasizing ecological energy management, sustainable production, and a circular economy as prerequisites for ensuring a viable future for society (Barata and Kayser, 2023).

Given these transformations, it is considered important to study the directions of human resource management under digitalization and sustainable development, as adopted in the practices of economically developed countries.

The objective of the study is to systematize the specific features of human resource management under the influence of digital transformation and the implementation of sustainable development goals, as well as to identify recommendations for enhancing the effectiveness of this process. To achieve this objective, several tasks have been set, including identifying leading practices in human resource management within enterprises under digitalization and sustainable development goals, and developing recommendations for improving efficiency in this area.

2 Human Resource Management in the Context of Digitalization and Sustainable Development of Enterprises

Let us examine the existing innovative practices in human resource management utilized in the context of digital transformation and sustainable development goals. These practices will be systematized within the main directions in this field.

We can highlight the intellectual direction of integrating digital technologies into enterprise human resource management processes.

Research indicates that implementing artificial intelligence in HR processes opens new possibilities for HR departments, especially in areas like recruitment, onboarding, and training. Artificial intelligence is transforming traditional methods, making them more efficient and tailored to the individual needs of employees and candidates. Analysis of scientific literature (Mer, 2023; Black and van Esch, 2020; Cai, et al., 2024; Nawaz, et al., 2024) identifies areas of artificial intelligence use within key HR management functions, specifically:

– automation of recruitment processes. Artificial intelligence enables faster resume screening, identifying the most suitable candidates through advanced algorithms. This reduces the time required for initial selection and allows recruiters to focus on more valuable tasks;

– personalization of onboarding processes. AI can customize the introduction process for new employees, taking into account their individual needs and preferences. This allows new hires to adapt to their new workplace more quickly;

– enhancement of training programs. Using AI allows for the analysis of training effectiveness and adaptation to better meet employees' developmental needs. This may include personalizing training materials or adjusting the learning pace to the participant's abilities.

It is important to establish the advantages and disadvantages of artificial intelligence.

The integration of artificial intelligence into human resource management opens new opportunities but also presents certain challenges. HR specialists emphasize that one of the greatest advantages is the automation of recruitment processes, which allows for faster and more effective selection of candidates for relevant positions. As a result, companies can focus on strategic aspects of talent management while enhancing their competitiveness in the labor market. On the other hand, concerns about data privacy and potential misuse arise. Therefore, experts recommend that organizations pay special attention to ethical considerations and the protection of personal data when implementing artificial intelligence-based solutions. Proper training for HR teams on the use of new technologies is crucial to maximize the benefits of artificial intelligence while minimizing potential risks (Black and van Esch, 2020).

It should be noted that the use of artificial intelligence in human resource management opens up new opportunities for the optimization and automation of many processes. Automatic resume screening, candidate data analysis, or even conducting preliminary job interviews are just some of the tasks that artificial intelligence can take on, significantly accelerating the hiring process and improving its efficiency. Additionally, artificial intelligence can help identify internal talents by analyzing employee data and recognizing individuals with potential for development in certain areas.

The analysis of scientists' approaches allowed us to formulate a list of advantages and opportunities that an enterprise gains when managing personnel through the use of artificial intelligence technologies, particularly (author's definition):
- the transfer of routine duties, previously performed by personnel, to robotic systems that carry out the work efficiently throughout the entire process;
- increasing the potential for employees to showcase their abilities and potential in more intellectual work through continuous and high-quality informational and technological support;
- reducing costs for implementing personnel processes (such as payment to recruitment agencies or in-house work on searching and selecting candidates);
- increasing employee satisfaction with the quality of their own work through the use of artificial intelligence tools that facilitate the execution of certain tasks and functions;
- raising the level of digital readiness of the workforce to adapt to future changes in digital technologies, as well as the ability to master new directions of activity and competencies. This opportunity, in our opinion, can be achieved if the employer company provides training and upskilling of personnel in line with digital transformations.

The implementation of artificial intelligence in human resource management is not limited to the recruitment process alone. Personalizing employee development paths, monitoring their well-being and engagement, as well as automating routine personnel management tasks, are other areas where artificial intelligence can bring significant benefits. As a result, HR managers can focus on more strategic aspects of their work, such as shaping organizational culture or planning long-term team development strategies;
- the possibility of replacing employees in contact centers during night hours, weekends, and holidays with chatbots. Thanks to machine learning and continuous communication with people, chatbots acquire more knowledge and skills that humans possess, making their use increasingly attractive for contact centers of businesses, institutions, and organizations. At the same time, companies interested in forming a high-quality workforce implement training programs that enable employees to acquire high-level knowledge on relevant technical, technological, and economic issues, helping them solve problems if a client cannot receive assistance from the chatbot on standard inquiries.

Based on the analysis of scientific materials (Mer, 2023; Cai, et al., 2024; Nawaz, et al., 2024), we identified examples of artificial intelligence integration to support human resource management:
- automation of recruitment and selection processes. This process is implemented using machine learning technology, within which the automated information system for recruitment and selection of personnel receives an algorithm to perform specific tasks and functions, executing them accordingly.
- analysis and processing of large volumes of employee data. Data on human resources potential is analyzed and processed using Big Data Analytics technology, which, like machine learning, operates according to an algorithm set within the information management system.
- personalization of learning and development processes. Employees can ensure their own professional and individual development within corporate training and skill enhancement systems. In this case, individualized access to the information necessary for learning and self-development in remote form can be used. Some large corporations provide training for all employees across various countries where they have branches or production sites, offering access to videos in a personalized format, considering time zone differences.
- monitoring and improving employee well-being. This can be implemented using technology such as computer vision. In many companies, with the knowledge of employees, video surveillance is installed, which also captures sounds. Accordingly,

the video of the employees' workday (including those working remotely) is processed in real time by the information management system, which automatically streams it. If a particular employee is feeling unwell, they can receive timely support (e.g., an ambulance call or other assistance). In large companies, sensors are also installed at the entrance to monitor viral diseases. These sensors can alert security that an employee has entered the office with an elevated body temperature. Consequently, if a workplace illness protection policy is in place, the employee will be informed that they need to undergo treatment and will not be allowed into the office.

It is important to note the goal-oriented effectiveness of integrating digital technologies into human resource management within companies.

In this case, the implementation of each digital technology is aimed at achieving specific goals and defined results for the company's development, including sustainable development goals.

At this stage, there is a lack of precise statistical data on how digitalization affects labor productivity. While there is information regarding the reduction of operational time for certain types of equipment, particularly automated ones, and data on reduced production or construction defects, there is no comprehensive data on how the productivity of the workforce in various professions improves when specific digital technologies are additionally employed.

There are certain empirical confirmations of this impact. For example, a study was conducted on the results of implementing systematic online training for employees of leading Chinese industrial corporations to ensure digital skills for professional competencies (where the program was either developed by the company or the personnel were directed to an appropriate training center) (Song et al., 2022). It was found that such training over the course of a year increased the productivity of these employees by 18%. The study also showed that the costs of training were low because it was conducted online, and mostly the companies' personnel were involved in organizing the training. Thus, the effectiveness outweighed the costs of organizing such activities.

From our perspective, we can distinguish a competitive aspect of integrating digital technologies into the human resources management processes of companies.

In this case, it refers to the recognition of the company by its partners in national, regional, and international markets for its commitment to implementing sustainable development goals. The role of digital technologies that improve working conditions and support the implementation of training programs is crucial. Accordingly, goals such as providing decent working conditions may be declared and implemented.

Involving human resources in achieving sustainable development goals in the ecological field (such as energy-efficient resource consumption and mastering green production technologies implemented by the company) ensures synergy in the green transition. These measures can also be supported by partners who are advocates of sustainable development in the environmental sphere.

3 Recommendations for Improving Human Resources Management

Ukraine, currently engaged in a war with the Russian Federation, faces significant challenges in preserving and enhancing the digital readiness of its workforce, as well as managing human resources in line with global trends and sustainable development goals. Many developing countries face similar problems, making it crucial to develop recommendations for optimization in this field. Based on our theoretical and empirical research, we have formulated the following recommendations.

Firstly, we propose the implementation of an approach to maintain the motivation of the workforce for continuous digital learning and self-improvement, both in their primary specialty and in supplementary fields that could become primary for them in the future. This approach could be implemented not through traditional means (such as creating and completing training programs) but by using modern artificial intelligence technologies. Specifically, we suggest the use of digital twin technology (or digital avatars). This technology allows for the transfer of real-world characteristics of an object into the digital world. Within a specific software framework, data about the state of an object is input, and new data can be added later. The advantage of digital twins is the ability to visually demonstrate their condition and predict future developments based on potential changes (this will also involve the use of artificial intelligence technology-neural networks). In standard production environments (Yao et al., 2023; Botín-Sanabria et al., 2022; Ruzsa, 2021), digital prototypes of various product models are created, and their production is carried out according to their parameters. The management information system notifies when requirements or standards are violated.

In the case of human resources, the use of digital twin technology could involve the following steps:
- **development and Implementation of a Mobile App.** A company-specific mobile application would be created for each employee to generate their individual digital twin. This app would allow employees to track and manage their development, well-being, and career goals;
- **defining Self-Development Parameters.** The app would enable employees to define their professional and personal development goals, as

well as parameters related to their well-being and career aspirations;

– **data Collection and Testing.** Interested employees who wish to participate in the pilot project would leave their "digital footprint," including their knowledge, skills, abilities, and aspirations. This data would remain confidential, accessible only to the individual and not shared with colleagues or managers;

– **company-Funded Learning Programs.** The employer would finance or create its own learning programs, courses, training sessions, and practical exercises aimed at enhancing various skills, particularly those related to mastering digital technologies within the employee's profession and role at the company;

– **selection of Learning Areas.** Employees would select the environments and fields for training, upskilling, or reskilling available within the company and mark these choices within the app;

– **periodic Testing and Evaluation.** Over a defined period (as determined by the app's developer), employees would periodically undergo testing to evaluate their progress in acquiring knowledge and skills. They would answer questions regarding their satisfaction with their well-being, career progression, and job satisfaction;

– **data Processing and Display in the Digital Twin Model.** The data collected from tests and employee input would be processed and displayed within the digital twin model for that employee. This would be done automatically based on the algorithms defined when setting up the app;

– **self-Review and Adjustments.** Employees could review how well their personal development aligns with their initial goals. As they progress, they would have the option to make adjustments to their development plan based on ongoing learning and performance evaluations.

This approach leverages the power of AI and digital technologies to provide personalized, flexible, and dynamic career development within the company. It would help employees to actively manage their growth while ensuring that the company benefits from a more skilled and motivated workforce.

In our opinion, this innovative solution will motivate employees and can be applied to a wide range of professions and sectors of the economy. Through participation in such a project, employees will be able to improve their self-esteem, more carefully monitor and regulate their self-development and professional life goals, knowledge development, and well-being. The implementation of this application does not impose high financial costs on large enterprises, and its widespread use could stimulate the digital environment to develop similar digital products that could be used by both medium and small enterprises. It is important to note that the measure we have proposed aligns with the sustainable development goals concerning decent work conditions. In particular, by participating in training programs, courses, and workshops offered by the employer, employees can improve their working conditions and well-being. Furthermore, the creation and implementation of the application (digital twins of employees) will contribute to enhancing the digital skills of the workforce.

Secondly, another relevant direction for improving the effectiveness of managing the workforce potential of enterprises in the context of digitalization and the implementation of sustainable development goals could be the rewarding of mentorship within the work team.

In any work team, there are employees who possess better skills in using digital technologies, especially in large enterprises. Companies that operate in high-tech manufacturing or software support fields require workforce potential with a high level of skills and knowledge specific to the job. Young specialists or new employees who have not previously encountered the specific features of production or services require proper training and support. Typically, most companies provide training (2 weeks, a month, or another period) during which new employees adapt to the specifics of the work and their professional duties. Some industries and service sectors prevent the allowance of defective products or low-quality services. These are usually enterprises that develop or produce high-tech products for export, or provide services related to the maintenance of innovative equipment, software, etc. In this case, it is proposed to involve senior specialists to support new staff until they are able to become mentors for others. This, in our opinion, will help maintain or improve the quality of products (services) and eliminate the costs associated with potential defects.

Thirdly, the creation of models for strategic management of workforce adaptation to digital transformations and the implementation of sustainable development goals by enterprises deserves attention. These models can include a comprehensive list of measures, their characteristics, and definitions at the operational level, as well as the identification of responsibility centers for implementation and the control of achievement.

It should be noted that the development of these models for strategic management of workforce adaptation to digital transformations and the realization of sustainable development goals can be carried out within the framework of general development strategies or in the context of strategies for implementing specific production projects (projects related to specific segments of the market environment). The analysis of approaches by leading high-tech corporations from various industries towards adapting human resources management to the course of sustainable development and digitalization has allowed us to formulate key directions for the strategic management model in this area (Table 1).

TABLE 1 Directions of the Strategic Management Model for Workforce Adaptation in Relation to Sustainable Development and Digitalization

Direction	Characteristic
Ensuring communication at the company and employee level	Creating clear and understandable explanations regarding the sustainable development goals that the company is implementing, and what is expected from the workforce in this area. Defining the directions of digitalization in the main areas, outlining its advantages, and specifying the requirements for employees to master digital technologies. Identifying the centers and actions within the company that enable employees to acquire and enhance their knowledge and skills in these areas. This includes listing email addresses and names of individuals in the corporate information system responsible for managing the process of supporting the improvement of digital knowledge and knowledge in the field of sustainable development
Identification of programs, courses, training, and practical tasks for employees in these areas	Employees are provided with a list of mandatory actions and those that are recommended. Those individuals who show interest and demonstrate results in both areas may become mentors for others in the future
Establishing a list of benefits and incentives for employees who demonstrate achievements in both areas	Clear and concise definition of the benefits and incentives for all results of participation in digital transformation and achieving sustainable development goals
Definition of flexible working conditions for employees who need them (if it aligns with the company's strategy)	In this case, if remote work is not used on a permanent basis, and if a specialist is able to perform their duties in such a form, the company can define the conditions for transitioning to its use. A clear, transparent mechanism for such work should be created for the relevant categories of specialists
Defining the conditions for adapting employees according to the established programs, courses, training sessions, and practical tasks for employees in these areas	A scheme for adapting employees with different levels of knowledge, skills, and experience is developed. These are determined in advance through online testing

Source: author's property

4 Conclusions

In the course of the research, the main directions of human resource management in the context of digitalization and the implementation of sustainable development goals were formulated and characterized. These directions include the following:

1. Intellectual direction of integrating digital technologies in human resource management processes. The implementation of this direction is associated with the following components:
   – ensuring an automated process for recruitment;
   – focusing on a personalized adaptation process for employees to the company's requirements in the sphere of digital transformation and support for sustainable development goals;
   – improving training programs according to the level of preparation of human resources in these areas.

2. Result-oriented direction of implementing digital technologies in human resource management. It is expected that the implementation of each digital technology is linked to the achievement of certain goals and defined results of the company's development, including sustainable development goals.

3. Competitive direction of integrating digital technologies in human resource management processes. This direction refers to the recognition of the company by partners in national, regional, and international markets due to its commitment to sustainable development goals.

The recommendations for improving human resource management were identified and substantiated, including:
   – implementing an approach to support the continuous digital learning and self-improvement of employees, both in their primary specialization and in additional ones that may become essential for them in the future;
   – rewarding mentoring in the workplace, which involves engaging leading and proactive specialists in the adaptation process of new employees to working with digital technologies and supporting the achievement of sustainable development goals.;
   – developing models for strategic management of human resource adaptation to digital transformations and the implementation of sustainable development goals by the company.

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