

# УПРАВЛЕНИЕ НА ЧОВЕШКИТЕ РЕСУРСИ

## СБОРНИК С ДОКЛАДИ

## ОТ МЕЖДУНАРОДНА НАУЧНО-ПРАКТИЧЕСКА КОНФЕРЕНЦИЯ

# HUMAN RESOURCE MANAGEMENT

**International Scientific-Practical Conference**

**Organized by the University of Economics – Varna**

**03 October 2025**

2026
Science and Economics Publishing House
University of Economics – Varna

The publication of this book is under Project № NPF-KS25-07HRM25 and is funded by a targeted subsidy to the state budget.

All published reports are refereed by acknowledged and leading specialists in the respective scientific area, members of the Editorial board. The authors are solely responsible for the content of the submitted reports.

This book or its parts may not be reproduced or transmitted in any form or by any means, electronic or mechanical, and copied without the written permission of the publisher.

© Publishing House „Science and Economics“, 2026

University of Economics – Varna

ISSN (Online) 2815-5084

DOI: 10.56065/HRM/2026

**EDITORIAL BOARD:**

**Assoc. prof. Katya Antonova, PhD – Editor-in-Chief,** *University of Economics – Varna*

**Chief Assist. Prof. Pavlina Ivanova, PhD – Deputy Editor-in-Chief,**
*University of Economics – Varna*

**Members:**

**Prof. Avram Eskenazi, PhD –** *Institute of Mathematics and Informatics, Bulgarian Academy of Sciences*

**Prof. Anita Jansone, PhD –** *Liepaja University, Latvia*

**Prof. Antoniya Dimova, PhD –** *Medical University – Varna, Bulgaria*

**Prof. Biljana Djordjevic, PhD –** *University of Nish, Serbia*

**Prof. José Luís Sousa Soares de Oliveira Braga, PhD –** *Institute of Higher Studies of Fafe, Portugal*

**Prof. Harun Uçak, PhD –** *Alanya Alaaddin Keykubat University, Turkey*

**Prof. Prof. Margarida Maria Mendes Rodrigues, PhD –** *Institute of Higher Studies of Fafe, Portugal*

**Prof. Miguel Jorge Rodrigues Magalhaes, PhD –** *Institute of Higher Studies of Fafe, Portugal*

**Prof. Miroslava Peicheva, PhD –** *University of National and World Economy – Sofia, Bulgaria*

**Prof. Nadia Mironova, PhD –** *University of National and World Economy – Sofia, Bulgaria*

**Prof. Rumen Kalchev, PhD –** *University of Economics – Varna, Bulgaria*

**Prof. Snejanka Ovcharova, PhD –** *Varna Free University „Chernorizets Hrabar", Bulgaria*

**Prof. Sunil Kumar Tiwari, PhD –** *Awadhesh Pratap Singh University, India*

**Prof. Thomas Garavan, EdD –** *National College of Ireland, Ireland*

**Prof. Tzvetan Davidkov, PhD –** *Sofia University „St. Kliment Ochridski", Bulgaria*

**Prof. Vouzas Fotis, PhD –** *University of Macedonia, Thessaloniki, Greece*

**Assoc. Prof. Alaa Tag Eldin Mohamed, PhD –** *South Valley University, Egypt*

**Assoc. Prof. Maxim Bakaev, PhD –** *Novosibirsk State Technical University, Russia*

**Assoc. Prof. Stoyanka Cherkezova, PhD –** *Institute for Population and Human Studies, Bulgarian Academy of Sciences*

**Assoc. Prof. Yeliz Yesil, PhD –** *Trakya University, Turkey*

**Chief Assist. Prof. Velina Koleva, PhD –** *University of Economics – Varna, Bulgaria*

**Chief Assist. Prof. Maria Veleva, PhD –** *University of Economics – Varna, Bulgaria*

**Chief Assist. Prof. Radka Nacheva, PhD –** *University of Economics – Varna, Bulgaria*

**Radoica Luburić, PhD –** *The Executive Director of the Central Bank of Montenegro*

**ORGANIZING COMMITTEE**

**Chairman:**

**Chief Assist. Prof. Pavlina Ivanova, PhD –** *University of Economics – Varna, Department of Agricultural Economics*

**Members:**

**Assoc. Prof. Katya Antonova, PhD –** *University of Economics – Varna, Department of Business, Investment, and Real Estate*

**Chief Assist. Prof. Velina Koleva, PhD –** *University of Economics – Varna, Department of Management and Administration*

**Chief Assist. Prof. Radka Nacheva, PhD –** *University of Economics – Varna, Department of Informatics*

**SCIENTIFIC FIELDS**

Innovative Approaches in Human Management

Human Resources Management in the Digital Era

## Contents

**SCIENTIFIC FIELD. HUMAN RESOURCES MANAGEMENT IN THE DIGITAL ERA ..... 8**

**1. Marian Pompiliu Cristescu, Radu-Anton Moldovan, Ana-Englitera Vişan, Cosmin-Virgil Tileagă**
Cyber HR: How key points analytics are reshaping talent development and performance evaluation within companies ..... 9

**2. Kiril Radev**
Human resource management in the digital age – transformation of leadership approaches and motivational catalysts ..... 34

**3. Yuliyan Narlev**
Developing Future-Ready Skills: HR Strategies for the Digital Workplace ..... 46

**4. Ina Petrova-Gancheva**
Enhancing communication in virtual teams through Business Process Management ..... 59

**5. Dean Vasilev**
The National Electronic Information System for Pre-school and School Education (NEISPUO) as a Tool for Effective Human Resource Management in Education ..... 64

**6. Nikolay Nikolov**
The Application of Artificial Intelligence in Higher Education: Learner-Centred Software Systems and Digital Accessibility for Students with Disabilities ..... 70

**7. Slavka Stamenova**
The need to ensure accessibility to educational services for students with special needs ..... 76

**8. Silviya Nikolova**
Offboarding – Information security, ethics, loyalty ..... 84

**9. Branislava Yovich**
Artificial intelligence in human resources management software ..... 93

**10. Radka Nacheva, Margarida Maria Mendes Rodrigues**
Measuring Employee Experience: Metrics and Software Platforms ..... 106

**SCIENTIFIC FIELD. INNOVATIVE APPROACHES IN HUMAN MANAGEMENT ..... 123**

**11. Mariya Ivanova**
Exploring the potential of social innovations for successful changes towards a fulfilling life and social inclusion of people from risk groups ..... 124

**12. Kamelia Narleva, Silvena Yordanova**
The role of innovative culture for the development of the maritime industry in the Republic of Bulgaria ..... 133

**13. Petar Kralev, Iva Panayotova**
360 Feedback 2.0: Empirical Study in Organizational Context ..... 142

**14. Bonimir Penchev, Latinka Todoranova**
Establishing University Artificial Intelligence Centers: A Conceptual Framework for Institutional Transformation in Higher Education ..... 153

**15. Daniel Petrov**
Barriers to Green Job Creation in Bulgarian Agriculture ..... 164

**16. Kamelia Narleva, Svetlana Dimitrakieva, Greta Ivanova, Yoanna Tsvetkova**
The role of human resources in the development of the maritime industry in the Republic of Bulgaria ..... 172

**17. Alexi Alexiev**
Best practices in talent management as a solution to the global shortage of qualified personnel ..... 180

**18. Katya Antonova, Pavlina Ivanova**
"Gig" economy – trends, challenges, opportunities ..... 187

**19. Velina Koleva, Margarida Maria Mendes Rodrigues**
The Four-Day Workweek – A Tool for Improving Work–Life Balance ..... 194

**20. Marlene Faris**
Women's Leadership in the Educational System of Israel ..... 208

**21. Marlene Faris**
Perceptions of Female Leadership in Arab Schools: An Analysis of Teachers' Attitudes and Influencing Factors ..... 214

**22. Yavor Nikolov**
Professional Competence of Real Estate Brokers: A Key Determinant of Service Quality ..... 219

**SCIENTIFIC FIELD**
**HUMAN RESOURCES MANAGEMENT IN THE DIGITAL ERA**

ISSN (Online): 2815-5084

INTERNATIONAL SCIENTIFIC AND PRACTICAL CONFERENCE ON HUMAN RESOURCE MANAGEMENT
DOI: 10.56065/HRM/2026.9, pp. 9 – 33

7th edition, 3 October 2025
University of Economics – Varna

# Cyber HR: How key points analytics are reshaping talent development and performance evaluation within companies

**Marian Pompiliu CRISTESCU[1], Radu-Anton MOLDOVAN[2], Ana-Englitera VIȘAN[3], Cosmin-Virgil TILEAGĂ[4]**

[1] Lucian Blaga University of Sibiu, Faculty of Economic Sciences, Sibiu, Romania, marian.cristescu@ulbsibiu.ro

[2] Lucian Blaga University of Sibiu, Faculty of Economic Sciences, Sibiu, Romania, raduanton.moldovan@ulbsibiu.ro

[3] Lucian Blaga University of Sibiu, Faculty of Economic Sciences, Sibiu, Romania, englitera.visan@gmail.com

[4] Lucian Blaga University of Sibiu, Faculty of Economic Sciences, Sibiu, Romania, cosmin.tileaga@ulbsibiu.ro

**JEL: M12, M15, O15, J24**

**Abstract**

Organizational efficiency and profitability depend not only on financial strategies but also on the effective utilization of employees skills and competencies. One of the persistent challenges faced by human resource management is the difficulty of systematically identifying what competencies employees possess, what skills require improvement, and how individual development goals can be aligned with broader organizational objectives. To address this research problem, this paper proposes an automated framework for centralizing key employee data, including professional aspirations, competencies, training needs, and career progression over time.

The methodology combines performance monitoring software with a skill-matrix-based decision system. By tracking tasks in real time and analyzing employee outputs, the system detects developmental gaps, highlights strengths, and recommends targeted training interventions. This approach not only enhances task allocation and time optimization but also supports managers in making evidence-based decisions regarding professional development strategies.

The results include improved productivity, more efficient resource allocation, and enhanced adaptability of human resource practices in dynamic business environments. The novelty of the study lies in integrating automated performance tracking with adaptive skill management, bridging traditional HR practices with modern data-driven solutions for both immediate operational and long-term strategic value.

**Key words:**
human resources, performance monitoring, employee evolution, efficient distribution, improvement, automation.

**Published by University of Economics – Varna**

*Citation:* Cristescu, M., Moldovan, R., Vișan, A., Tileagă, C. (2026). Cyber HR: How key points analytics are reshaping talent development and performance evaluation within companies. *Proceedings from 7th International Scientific and Practical Conference on Human Resource Management (ICHRM).* University of Economics – Varna, pp. 9 – 33. DOI: 10.56065/HRM/2026.9

## 1. Introduction

Human Resources (HR) acts as a pivotal driver in the development, profitability, growth and helps organization with continuous evolution. This department, beyond administrative functions ensures that human performance and evolution is continuously monitored, the happiness and motivation at work is sustained, productivity is maintained, and relationships with external clients, suppliers and stakeholders, are sustained. Businesses that fail to manage HR, risk producing a toxic organizational culture, less innovation, and offering little support for employee development. Often, these limitations result in low productivity, poor recruitment decisions, inconsistent hires, increased costs, and reduced profitability, which over time may lead to reputational damage or even difficulties in sustaining their business.

Traditionally, HR was understood predominantly as an operational function who manage contracts, payroll, and track employee records. Across time, the HR role has shifted significantly. Artificial intelligence, digital transformation and automation, recruitment gap, and the expanding necessity for skilled, adaptable, dynamic and resilient employees have pushed HR from the back office into a new strategic and coordinated placement. Today, in an era of constant technological change, process automations and systematization, HR contributes to attracting, evolving and preserving skilled employees, ensuring recurring upskilling and reskilling, keeping employees motivated, and aligning human capital with organizational performance.

Frequently described as the fourth industrial revolution, Industry 4.0, created a substantial pressure on companies by enabling digital modernization, data-driven practices, big data usage, systematic interconnectivity, and artificial intelligence incorporation (Agolla J. E. (2018)). In the past, most of the managerial decisions were based on intuition and perceptions, now most of the organizations utilize real time data regarding the feedback, employee performance, competencies, mistakes and engagement. Despite of that, employee retention continues to be a critical challenge across industries. Declining performance, reduced productivity, the substantial costs of staff development and digital infrastructure can restrict organizational efficiency. Reduced career development, restricted capacity for upskilling and employee dissatisfaction, often lead to frequent job changes; in this situation the companies are enforced to ensure employee loyalty via design-orientated strategies or to reinvent themselves. Durable business advantage, in today's economy, is no longer sustained primarily by financial resources but on adaptability and workforce capabilities. Although the phrase „people are the most valuable asset" is frequently cited, it derives significance only when supported by precise information and systematic analysis. In the absence of clear vision of employee skills and organizational needs, business confront difficulties in strategic planning and resource allocation.

One of the key and critical issues is the unstructured staff-related information. Previously, training programs were initiated intuitively and not based on evidence and feedback was split across multiple files, google sheets, or verbal notes. In today`s environment, organizations require specific and real-time data created by employee behaviour to facilitate HR strategies. Work–life balance has also evolved into a fundamental component in employee engagement, also individual career aspirations are still hardly overseen or reviewed into HR regulatory policies and strategic initiative, generating a lack of long-term career development and intrinsic motivation. Nguyen, T. M., Malik, A., & Budhwar, P. (2022) findings indicate that most of employees identify a pivotal factor in leaving or staying with an organization the possibility for skill acquisition, to advance professionally and improve their grasp of expertise. After bonuses and salary, work–life balance is considering the most important factor. In a similar line, Worley, C. G., & Lawler, E. E. (2017) highlights that employees demonstrate full involvement on emotional, and physical levels when they are wholly committed. This synchronization between work roles and self-concept stimulated deeper commitment and sustain durable organizational performance over time. These discrepancies between organizational procedures and workforce expectations accentuate the requirement for innovative HR mechanism that incorporate both perspectives

The present article evaluates the impact of HR automation by investigating the processes before and after implementation. It is developed as a conceptual framework study and therefore does not include a specific organizational case analysis or empirical validation. Rather, it outlines a consolidated framework that align career advancement process, including acquired skills, training history, career aspirations, and efficiency in task execution. To map existing skill set and harmonizing them with company objective and employee performance objectives, a skill-matrix framework is proposed. Moreover, Control IQ software is applied to evaluate key performance indicators (KPIs), analyse performance in real time and generate quantifiable results. By applying this procedure, organizations can identify training needs for upskilling or reskilling, allocate responsibilities to employees with the highest expertise, and generate reports for both sides: institutional and individual levels. Rather than relying on traditional monitoring tools, which offer delayed and static analytical outcomes, the proposed solution prioritizes real-time tracking, goal-orientated training, allowing for recognition of performance gaps and continuous employee development.

This research hypothesis focuses on harmonizing traditional HR practices with innovative analytics and modern data-driven methods. Through the incorporation of real-time monitoring and involving adaptive skill management, it helps the organization and managers to optimize resource allocation, making decisions based

on evidence and anchored the alignment between organizational strategy and personal development trajectories. The forthcoming analysis presented in this paper is structured as follows: Section 2 reviews the literature and develops the research hypotheses, Section 3 presents the methodology and proposed framework, and Section 4 discusses results and conclusions.

## 2. Literature Review and Hypotheses Development

### 2.1. Digital and Analytics HR

Analytics HR requires structured tracking information and examination of staff members and talent data with the principal objective of strengthening organizational outcomes. HR managers and executives leverage these analyses to produce evidence-based insights regarding their workforce, targeting not only to elevate work procedures but also to facilitate a positive and sustainable organizational experience for employees. Broadly categorized as talent analytics, this approach is designed to use staff information to analyse the effect of outcomes on organizational objectives and to ensure the operational efficiency of HR practices in alignment with organizational goals.

The analysis is designed to focus on employees needs, career development opportunities, challenges, their skills, their position and the processes they follow to conduct tasks. It brings together the information from multiple sources, collects, consolidate the data and builds models to identify key success factors for effectively coordinating current staff and hiring suitable candidates for the open positions. HR departments, through the application and integration this data, can recognize the training needs, skills gaps, outcome deficiencies, and the performance of executed processes, verifying whether employees have adapted to new workflows effectively.

HR departments from a digital prospective are engaged in achieving outcomes by implementing automation and transforming traditional paper-based procedures into digital workflows, driven decision-making and intelligence analytics. This organizational shift from manual work to technology-driven practices strengthens performance and effectiveness, enables management to make more rapidly, efficiently and informed decisions, elevating operational efficiency. Centralizing large volume of data from multiple sources into a consolidated platform, strengthens the quality of decisions, facilitates efficiency in HR management, standardizes processes, enhances quality, simplifies operations and reduce manual work.

The implementation of digital solutions, cloud-based and artificial intelligence interventions empower HR decision-making to reconfigure its conventional practices, facilitating decision-making based on authentic and impartial data rather than intuition. Digitalization substantially reconfigures how organizations work alongside with employees, encouraging collaboration, building engagement and commitment. HR automation and digitalization is not merely a digital transformation, it reflects a systematic workforce reconfiguration of holistic HR modernization and administration.

Artificial Intelligence, automation and digitalization, in recent times, have a significant elevated HR departments with the efficiency to process large volume of data, highly personalises information, meanwhile maintaining human-driven orientation. By harnessing these digital tools, both organizations and employees can produce enhanced results and unleash unrealized potential. Factory of the Future referres to Industry 4.0, which indicated the integration of digital technologies in manufacturing processes, artificial intelligence and digitalization has led evaluation of HR as a driver of innovation 4.0 (Agolla J. E. (2018)). This strategic orientation for workforce development eliminates repetitive tasks, prioritizes strategic problem-solving, standardizes routine procedures and productivity-focused initiatives.

### 2.2. Efficiency monitoring systems

Employee performance in HR evaluation requires rigorous identification, organized detection, systematic mapping of workflows and efficiency of an individual's contributions within a company.

Monitoring systems represents a strategic element of organizational management, as performance measurement support companies to review the principal factors impacting employee efficiency. In the current context of global environment, where performance competition is amplified intensity, companies must remain

efficient, profitable, dynamic and results-oriented to ensure continuity of their market placement. Keeping contextual alignment, human capital plays a crucial role: employees should not be viewed exclusively as routine performance but as strategic assets that facilitate sustainable institutional success. Staff performance is imperative be tightly integrated and closely aligned with objectives of the company.

Only when staff members and workforce strategy planning integrate synergistically to attain common outcome the strategic objective can be accomplished. To meet these expectations, companies are required to guarantee that employees' daily tasks are steadily associated to organizational objectives and actively facilitate their attainment. The strategy of monitoring employee performance redefined not only a indispensable managerial function but also a primary organizational anchor for tracking progress in real time and achieving goals. Ensuring the sustainable achievements are produced by adopting the performance monitoring system, companies should secure ongoing compatibilities between individual performance, team level productivity and strategic organizational priorities. The ability to analyse, examine, measure and evaluate performance help entities to have a significant advantage in highly competitive environments, particularly in dynamic ones.

Workforce performance tracking plays a crucial role in integrating individual activities with the strategic objectives of the entity, especially when tools such as Key Performance Indicators (KPIs) and Objectives and Key Results (OKRs) are used for tracking progress. (Dragan, P.-P., Chivu, M., & Spiridon, P.-P. (2025)). This harmony encourages the enhancement and drives the progression offering a strong result, clarifying priorities, promoting responsibility, cultivating equity and accountability, enabling tracking real-time progress, and advancing transparency and fairness in daily activities. Also helps employees to understand of how important their individual contributions is and how it affects the overall organizational success. Instead of using traditional annual or semi-annual employee productivity review, innovative monitoring systems facilitate continuous actionable feedback on each task and clarity regarding expectations on each completed activity. This sustained interaction helps business development by enabling employees to identify and correct errors, feel consistently supported in their growth and elevate their performance. However, continuous feedback helps avoid mistakes, stimulates confidence and strengthens the collaboration between employees, managers, and the organization.

Continuous monitoring also fosters the prompt recognition of training needs and performance deficiencies in work processes, leading to the creation of internal expertise database.

Department leaders can capitalize on these insights to recommend role adjustments, or targeted training, promoting continuous learning, growth, ensuring workforce engagement while reducing the risk of regression. If the monitoring system is carefully implemented and well-designed, it can provide transparent data, generate realistic objectives, reduce the favouritism in managerial decisions and influence of bias.

This transparency reinforces employees' confidence in the company, increases trust in the organization and evaluation process. Furthermore, employees become more motivated, proactive, and dedicated as they see a direct correlation between their efforts and institutional result. Ultimately, by providing clarity for each member contributions, companies can effectively recognize employees' merits, engagement, and dedication, thus promoting a culture of sustained performance and appreciation.

### 2.3. The impact of Skill Matrix

The skill matrix instrument is used in human resources department as a visual tool, implemented to review, determine and display employee competency levels in connection with skills required within a company. This matrix evaluates employees across a performance hierarchy, being represented as a chart or table: absence of knowledge, beginner, intermediate, proficient, advanced, expert, for each individual skill. Unsing this instrument and systematically mapping competencies, companies can plan targeted training programs more strategically, can identify the knowledge gap more effectively and can allocate the tasks or projects more efficiently compared with traditional evaluation methods.

By enabling real-time monitoring progress for both team and individual, skill matrix ensures that human capital development remains closely aligned with company goals.

For integrated understanding, the perspective of the skill matrix is directly correlated with multiple related frameworks:

Competency frameworks: organizational structures that define the knowledge, skills, values, and behaviours required for specific roles withing the company.

Capability maps: charts of tables that is directly correlated with organizational strategic objectives with the specific staff aptitudes, accordingly, illustrating how workforce capabilities support company goals.

Skills taxonomy: a structured classification model that categorizes and organizes employee skills, enabling comparability across roles, departments, and sectors.

The skill matrix, based on these frameworks, is not only an assessment instrument which identify the lack of training, but also as a strategic instrument for linking the talents with long-term business development (Ali, M. M., Tahir, T., & Khan, F. A. (2021)).

Incorporating these tools and values aids in creating and supports the establishment of an organized process for the progression and evolution of employees' skills and capabilities. Therefore, creating a mutually beneficial framework for evolution helps to link individual goal with organizational needs.

The skill matrix, from HR analytics prospective which require data analysis, verification and interpretation, helps not only by evaluation and tracking progress but also as a source of strategic information. By utilizing this software, companies can track the progress completion for a specific project, employee performance in real time and determine competencies and capabilities with accuracy.

This system can indicate stagnation patterns, development opportunities and can recommend targeted trainings for reskilling and upskilling. Also, can generate accurate reports that indicate individual professional growth, and companies decline or advancement. Therefore, skill matrix is a critical tool in workforce development and human capital monitoring, offering macro-level overview of company's performance and a micro-level perspective on talent competency (Jooss, S., Burbach, R., & Ruël, H. (2024)).

This system can help entities with further supports by evaluate the competencies for leadership roles, identifying high-potential leaders, creating accurate plannings, and structure a personalized strategy plan. With all these skill-related information, companies can allocate internal resources more effectively to fulfil vacancies, create internal promotions, reducing external recruitment costs associated with a new employee. Furthermore, skill matrix tool encourages continuous professional development and improve the return of human capital. (Vuong, T. D. N., & Nguyen, L. T. (2022)).

This tool improves clarity, increases visibility in employee evaluation and promotion and bolsters trust by depending exclusively on illustration skills and measurable outcomes. This procedure strengthens employees' credibility in both the companies and its performance monitoring systems, while also reinforcing visibility, value, advancing recognition and inclusion in the comprehensive processes of professional development and business evolution. Within the framework of technological advancement and digital integration, the skill matrix has transformed the human resource department into a strategic instrument, enabling mapping, personalization, digitalization, and advanced analysis of organizational data.

Using digital dashboards, companies can track qualification and aptitudes in real time, detect critical lacks or errors, and generate interactive reports that provide a clear vision and more comprehensive understanding of the business's talent, and managers can have an explicit orientation about their team. Furthermore, the implementation of digitalization and artificial intelligence allows for the identification of training and professional development needs, offering personalized recommendations linked with companies' goals, objectives and improves decision-making.

Nowadays, multiple platforms support the implementation of this type of systems, including LinkedIn Learning, Control IQ and SAP SuccessFactors Skills Module. These systems provide workforce insights and perspective, competency evaluation, effectiveness assessment and strategic planning by monitoring evaluation progress and ensuring alignment with company's needs.

A literature review conducted by Vuong and Nguyen (2022) accentuates that companies adopting standardized competency criteria can ensure impartial evaluation and clarity in performance management, also encouraging more informed and balanced decisions regarding employee training, promotion, and career progression.

Worley, C. G., & Lawler, E. E. (2017) in their research highlights that companies with strong adaptability steadily increase to include skill-based frameworks to faster and efficiently respond to rapid changes in the

organization environment. These configurations facilitate companies to align more effectively with key objectives and adapt to market requirements by utilizing human capital capabilities.

Extending this interpretation, a global study conducted by McKinsey in 2023 demonstrated that nine out of ten companies believe a „skills-first“ framework to recruitment, training, and promotion will become a conventional approach by 2030. Under these circumstances, the skill matrix becomes an essential instrument to support the transition, establishing a systematic framework skill recognition, evaluation and developing workforce promotions.

Additionally, the World Economic Forum's Reskilling Revolution initiative (2020) evidence the urgent need for employees reskilling, anticipation that approximately 50% of all employees will demand retraining by the end of 2025 to remain competitive and efficient in a fast-growing environment. In addition, the skill matrix creates effective outcomes, facilitating organizations to identify lack of training and gaps in competencies, develop customized roadmaps and pathways, and integrate reskilling into strategic plan of development. Through this approach, the tool facilitates both companies' adaptability and employee flexibility and endurance in an era of continuous transformation and artificial intelligence.

The discussion so far has concentrated on benefits and favourable aspects of implementing the skill matrix and digitalization, also it is important to mention the limitations and possible obstacles identified so far in practice.

This system provides various information and explicit overview of employee's skills and competencies, sometimes it may underestimate certain capabilities that are difficult to capture such as emotional intelligence, global mindset, cultural adaptability or critical thinking. These set of skills are frequently omitted or routinely ignored from the matrix, even if they are essential to business success, due to difficulties in evaluation, which can conduct to a partial evaluation of employee abilities. However, the same ability can be quantified differently across the company.

Automated systems who integrate artificial intelligence in evaluation processes, even if they are efficient sometimes can produce historical prejudice and use outdated information in actual performance patterns. However, this situation may be perceived by employees as intrusive, and misleading information or inaccurate data can facilitate employees to lose trust and feel over-controlling, also, managers may feel that their autonomy is being restricted.

The strategic benefits of skill matrix system, even if faced challenges, remain essential, by having consolidated dataset, companies can highlight the most effective talents to allocate them to key positions in the organization, thus the allocation of human resources will be more optimized, task execution times will be shorter, leading to greater profitability for the company. Also, workforce requirements are constantly monitored, and reskilling and upskilling programs are adapted to their needs, thus leading to reduced staff turnover, employee loyalty is encouraged, and they feel supported at every stage of their development process.

Finally, by integrating future-oriented on employee progression, the skill matrix helps companies to early identify potential stagnation or talent evolution pathways. As a result, skill matrix it becomes a crucial factor of data-driven HR analytics, encourages organizational growth, improve performance process and bridges the gap between employee aspirations and organizational priorities.

### 2.4. Data driven decision in HR

In the current age of automation, digital transformation and business transformation, organisations encounter amplified expectations to operate with rapidity, efficiency, and adaptability. Maintaining competitiveness become a crucial factor, furthermore, decision-making on reliable information and precise data, evidence-based has a strategic importance. To respond efficiently to market competitive pressures, in opposition to traditional HR strategies, where decisions were made intuitively, modern human resource department must leverage on verified, analysed and centralized information.

This change is utilized particularly in companies distinguished by fast technological transformation, where is critical to synchronize with industry trajectories for maintaining operational impact and resonance providing goal-orientated contributions.

The most predominantly benefits of a data-driven HR are characterized by rigorous precision, accuracy

and analytical neutrality. Instant access to up-to-date data sources facilitates swift adjustments and agile responses to change circumstances, empowering performance-driven distribution of human resources and maximized performance optimization during periods of ambiguity or emergency conditions. Cultivating organizational credibility and improving workforce transparency and reliability, is essential to enabling strategic investment decisions by analysing historical data to anticipate future risks and predictive planning.

Data-driven HR approaches transparent data illustration of workforce capabilities, optimize employee grow with learning recommendations, and link individual goals with companies' priorities. HR functions have a crucial impact in vision-aligned decision-making, supplying measurable advantages including:

Improved neutrality in employee evaluation

Amplified decision-making procedures

Customized progression strategy and development trajectories

Evidence-based planning process

Enhanced evaluative neutrality and improved evaluation frameworks is one of the most impactful benefits of consolidating data into human resource management.

Assuring transparency, accountability and process clarify using standardized indicators, companies can minimize preferential treatment and favouritism. Davenport et al. (2018) identified that organizations adopting data-driven HR methodologies are approximately 5% more efficient and 6% more economically viable than those utilizing on traditional evaluation methods. Utilizing perpetual observation improve organizational responsiveness, facilitating the early identification of performance issues and encouraging timely adjustments to progression strategies.

Companies can optimize workforce development by constantly monitoring and analysing individual performance data, recognizing proficiency gaps and suggesting strategic training program.

Research conducted by Google People Analytics illustrated that preservation of high-performing employees expanded by up to 50% when anchored and validated by a personalized database.

To incorporate artificial intelligence (AI) in HR departments demonstrates the capabilities to influence evaluation and talent acquisition process.

To avoid vulnerabilities, it is crucial to include specialists in digital ethics and perform scheduled inspections of AI systems. Another crucial diligence is the protection of workforce private data, which may be faced with unauthorized access.

Aligning with GDPR regulations standards and integration of stratified access protocols are essential to preserving privacy.

Facilitating employee participation in constructing performance parameters and defining the conceptual alignment of AI-driven evaluations, supports misinterpretation of employee tracking and integration of new technologies.

### 2.5. Hypothesis about automation, performance monitoring and skill matrix integration

#### 2.5.1. Real-time performance monitoring strengthens workforce assurance in reliability of valuations

Historically, workforce effectiveness evaluation operated with limited evaluative criteria and was influenced by the empirical insights, experience, knowledge and subjective interpretation of managerial perspective.

Traditional methods, including annual performance reviews, developmental checks, and evaluative interviews required an integrative review of yearly initiatives, which conduct subjective information and lacks objectivity. From a different perspective, modern tools such as AI analytics, KPI dashboards, and real time tracking software facilitate objective and sustains the process of performance monitoring. These softwares monitor empirical indicators, including punctual tasks executions, quality of work, level of commitment, duration of completion tasks, and real-time progress on specific projects.

Research illustrated by Zhang et al. (2025) indicated that electronic performance monitoring systems calibrated to measurable growth, rather than passive supervision, positively influence employee self-

determination and goal orientation. By minimizing managerial bias and excluding the impact of subjective inclination, continuous monitoring and performance tracking, supports transparency and faith in organizational evaluations. As a result, these frameworks contribute to a more stable and transparent organizational atmosphere and improve the precision and credibility of employee evaluations.

#### 2.5.2. The incorporation of the skill matrix enables more efficient resource allocation and assists in reducing training costs

The skill matrix is an essential mechanism within HR department, facilitating a structured visualization of employees' aptitudes, training levels, strengths, skills and behaviour indicators.

Based on the findings of Vuong and Nguyen (2022), merging skill matrix information with real-time productivity measures, enhances more effective workload distribution and responsibilities across projects. This comprehensive strategy allows companies to identify employees with low activity or under engaged staff and makes sure that allocations are matched to evidenced capabilities rather than qualifications without applied evidence. As a result, training costs are reduced, staff potential is fully utilized, resource unit is fully leveraged, and operational efficiency is improved.

#### 2.5.3. HR process automation facilitates targeted career shaping

For modern companies, employee loyalty remains a strategic concern.

Studies demonstrates that employees feel motivated not only by salary but also by personalized learning, professional growth and a healthy work-life balance. The application of artificial intelligence and automation in HR operations facilitate the personalization of individual development pathways.

Outlined by Discover Sustainability report published in 2025, companies that integrate automation and digital technologies within HR department, highlight higher satisfaction scores and greater workforce adaptability. Therefore, the risk performance decline and decreased professional motivation is reduced.

Companies can sustain balanced and productive work atmosphere by automating HR procedures and impacting positively employee commitment.

#### 2.5.4. HR data analysis encourages the advancement of situational adaptability within dynamic organizational environments

HR analytics contributes significantly to analysing, extracting and making use of employee data to anticipate and detect employee needs and promote evidence-based talent development.

Workforce needs more than technical skills; they also need flexibility, agility, versatility, and dynamic skillsets including fast learning, critical thinking, positive attitude and potential for reskilling.

Also, HR analytics helps companies to attract and retain versatile talent, boosts internal performance and align companies' objectives with individual goals.

Helping companies to anticipate future employee's needs, HR analytics boosts role adaptation to industry changes and sustain a competitive talent pipeline.

## 3. Material and Methods

### 3.1.1. Research type

This study combines both replicable and analytical perspectives of exploration in HR analytics, automation and digital transformation and applies a conceptual practical framework.

The purpose of this research is to implement digital transformation and automation in the human resources department with the essential mission to improve decision-making, stronger workplace concord and measurable outcomes.

For effective outcomes, this study utilizes real-time tracking software and automated processes to constant monitor and analyse HR data, all of these being facilitated by the Control IQ system.

Control IQ system helps companies to identify resource imbalances, inefficiencies, highlights productivity, unlock underutilized resources, provides adaptive feedback across different departments, keeping

workforce engaged and offers visualizations and dashboards helping managers to have a better overview across the business.

This proposed model construct dashboards from real time activities and is not sourced from pre-existing datasets, from a practical perspective is simpler to employ and from conceptual side is dynamic and has versatile essence. To generate measurable outcomes, this system aggregates doctrinal perspective with practical observations.

The strategic intention is to prevent functional disruption while is confronted with organizational difficulty by developing a strategy which is linked with company`s objective.

Reflecting the light of this research scope, this operating model is utilizing hypothetical data for validation rather than real inputs.

This scenario underscores the applicability and capability of the performance aspects of this framework, in accordance with methodological principles of using confidential data (Yin, 2018), also, the detailed description of these processes ensures the replicability of this process.

The proposed methodology can be used by any organization who implement Control IQ or any other similar systems and can obtain predictable, stable and comparable outcomes. The principals of Industry 4.0 conveys that transparency and replicability represent a critical aspect for HR solutions (Ferrigno et al., 2023).

### 3.1.2. Methodological exposition for the research proposal

The approach proposed in this research within the human resources department is an analytical one starting with the creation of conceptual models, which will later be empirically validated. The methodology used focuses on the development of dynamic, flexible and adaptable frameworks to any changes that help to polish, adjust and correctly test the information held.

Based on Davenport, Harris, and Shapiro (2010) research, it is essential to build conceptual models that help us build strategies utilized in the use of real data, coming to the aid of practitioners and researchers to help them understand employee performance and generate systematic analyses.

Also, Vuong and Nguyen (2022) in his research, highlights that combining theoretical concepts with practical analysis tools, represents some of the most sustainable strategies for evaluating team performance.

The framework proposed in this research is updated with the specialized literature and contemporary trends to adapt to different organizational needs and to be empirically tested. Industry 4.0 and its associated transformations, support the use of real-time monitored data, the reconfiguration of traditional management processes, the implementation of automation and the integration of digitalization into the decision-making structure.

Based on Ferrigno et al. (2023) findings there is a great deal of pressure on companies to store large volumes of data, analyse and integrate it in real time into organizational processes.

This study focuses directly on these implementation conditions, providing a data-centric framework, with a replicable structure but also adaptable to specific organizational needs, designed to improve decision-making, reduce errors and solve challenges within the human resources department based on evidence.

### 3.1.3. Theoretical framework

Design Science Research (DSR) methodology is utilised in this research, which is widely applied in different studies for human resource management and systems information. This method is focused on practical problems and coherent and deliberate structure, being easily recognised for the ability to incorporate theoretical information with operational and practical application (Hevner et al., 2024).

This proposed framework aspires to integrate employee needs, competencies and goals with strategical organizational priorities, suggesting upskilling or reskilling, utilizing continuous monitoring and customised training recommendation. This proposed system is integrated in human resource departments aligned with specialized literature and optimised by functionalities of Control IQ.

Utilizing the DSR procedures, this study follows a design set of steps, such as issue recognition, solution design, testing, review operational context, analysis and evaluation practical relevance of the results.

In this presented study, the challenge recognised is the unintegration of an efficient system that link and monitor employee achievement within the digitalized HR environment. The solution provided is scalable and adaptable and created to identify the gaps across various organizational settings.

To validate the concept applicability in real world context, this paper illustrates a hypothetical case study that highlight the way of implementing this framework, using Control IQ system.

The experimental case proposed represent a banking organization, where all the employee's data such as training histories, skills, competencies, performance indicators, hobbies, are integrated and operationalized in the system, evaluated and analysed to optimize resource allocation and validate the methodology reliability. This case example aids in conceptualization of theoretical paradigms and demonstrates practical feasibility in real world environments with the potential for extended verification.

### 3.2. Data sources

Employee related data was incorporated into the Control IQ platform, who functions as a machine learning integration system, centralized to sustain human resource management processes, and analyse behavioural patterns, competency and trends through evidence-based data. It was established to aggregate data from multiple sources and unify them to provide an accurate representation of the company`s position and progress and assist organizations in career planning and performance evaluation. The inputs analysed by the platform are split in five categories and contribute to a clear overview of the organizational structure in the alignment with their strategic objective and corporate priorities.

The first category analysed by the platform is the most critical one and illustrate the information of individual performance. The proposed platform, Control IQ, monitor workforce activities continuously and in real time via implementation of qualitative and quantitative performance indicators, the following exemplification are included: accuracy in delivering data, time needed for completion, achieving the deadline, and identifying the issues.

The data-driven insights facilitate managerial decisions regarding career progressions, reallocation of workload, and specific intervention that direct toward overall effectiveness (Zhang et al., 2025; Siraj & Hágen, 2023). However, real-time workforce tracking provided by the Control IQ platform helps to early identify discrepancies or shortfalls in performance, assists in personalized development plan and provide constructive feedback.

A second category relates to competencies and skills cumulated withing the Control IQ platform. In this module is included information related to feedback received from the colleagues or managers, professional certifications obtained, external or within the company. Assembling this data enables us to centralize a skill-mapping system, which serves in findings gaps, focus on training program and detect or discover critical shortages, aligning them strategically with the company priorities. These operational models streamline upskilling and reskilling interventions, securing that employees competencies are in concordance with organizational requirements. (Vuong & Nguyen, 2022; Dhawale & Lohar, 2021).

The third category centrelines data for professional evolution, focuses on training and participation on development programs. Control IQ maps historical information for each employee regarding certification levels, course types and the performance outcomes, before and after training. Tracking this information enables HR departments to see the progress and to improve training recommendations based on each employee's individual profile. HR 4.0 promotes this type of personalised analyses, facilitating long-term competency development (Indrasari & Pamuji, 2023; World Economic Forum, 2023).

Another essential category is represented by professional aspirations. The Control IQ platform not only tracks the professional evolution and certification levels, but also accumulates self-reported data regarding the employees' occupational ambitions, such as international mobility, role changes, desired promotions and different preferences. Analysing this data, companies can create customised career development for each employee based on their aspirations, needs and priorities, linked with corporate objectives. This synchronization contributes to an optimal human resource allocation and create a strategic and detail employee planning. (Google People Analytics, 2019; Jooss et al., 2024).

The final category brings together the workforce needs and aspirations and organizational perspective and priorities. Implementing this, Control IQ manages the administrative HR data and integrates it in different systems, such as: Oracle, SAP, Workday and HRIS. Based on this implementation, the platform gathers structured information about the workforce, such as employment history, compensation, rewards or absenteeism. Having this consolidated information updated in real time, HR department can evaluate the impact of each employee on organizational performance, workplace safety and overall stability.

The Control IQ platform operates as an interconnected landscape that aggregates information from training reports, personal aspirations, performance evaluations, including external applications such as: Asana, SAP, Workday and HRIS. Real-time continuous monitoring combined with feedback mechanisms and internal surveys, this integrated platform outputs a personalized and updated dataset that help companies on their priorities and strategic targets.

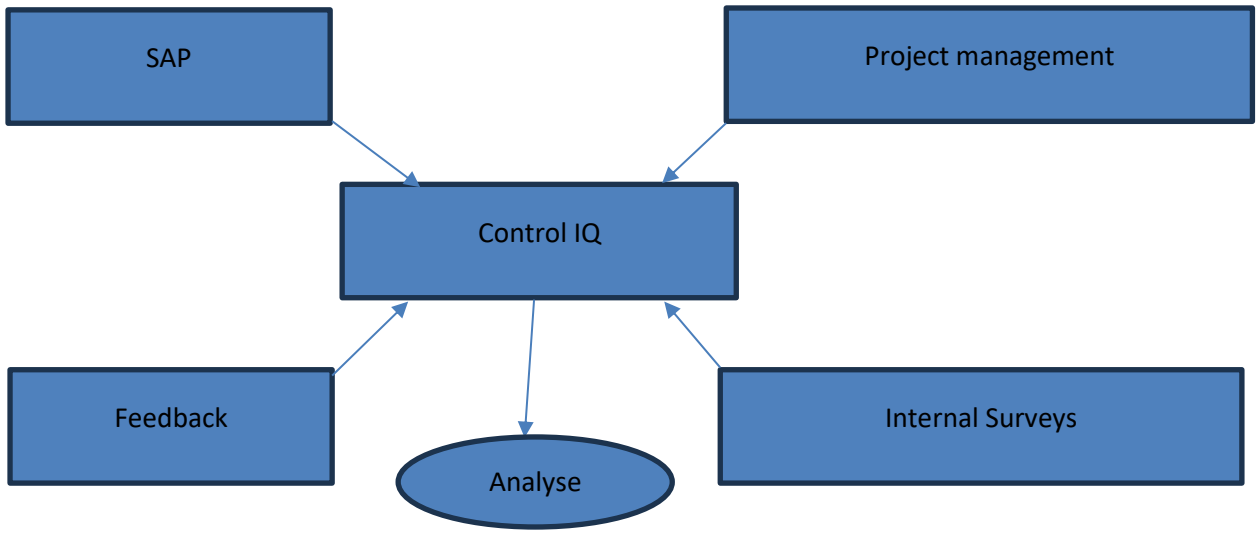



**Figure 1: Integrated data system**

This figure represents a synergistic network interconnected within the Control IQ platform. Based on management instruments, internal surveys, feedback loops and SAP synchronization, the Control IQ platform consolidates the data and brings to the management team a unified structure. This collection of data sources is continuously analysed to produce actionable insights and support human resource department with evidence-based decision-making.

### 3.3. Control IQ implementation

The Control IQ implementation is codified on a modular process that assimilates multiple data sources,

analytical interface and components of evaluation. Each component from the designed process integrates multiple aspects of task execution such as professional aspiration, training participation, capabilities, analytical thinking, progress and issues provided. All these details brings light intro the HR department and support them by generating data-driven reports.

Human Resource Information Systems (HRIS) such as: Workday, SAP and Oracle allow Control IQ to collect data in order to supply performance evaluations, verifiable records on attendance, professional history, employment contracts and completed training programs. Also, this data can be integrated with project management platforms such as : Trello and Asana to support accessibility to deadline adherence or execution times, achievement rates, task-level performance and commitment across projects.

The real-time synchronization updates are under strict security protocol, ensuring the confidentiality for each employee's profile under the data transfer. This framework enables Control IQ platform to

operate as a main data centre. In this consolidated information platform, data is analysed through a dynamic skill matrix facilitating linkage between workforce needs and the companies targets.

In the first step, workforce information is centralised from multiple sources, and each employee will receive a unique identification code, after this, each task is linked to the relevant performance indicators and applicable competencies. The whole process is conducted by the organizational procedures and improved by machine-learning analytical algorithms such as anomaly detection, data segmentation and predictive trees. This process conducts to an easy identification of systemic weaknesses or key organizational deficiencies.

The succeeding stage includes adaptive recommendations and automated alert generation, by demonstrating the ability to provide context-specific suggestions based on systematic analysis. Also, can advise on the targeted development programs and recommend algorithmic roles based on their aptitudes.

A fundamental aspect of this model is interactive reporting dashboards, which facilitate HR specialists, managers and employees by graphically presented real-time information in a transparent structure. Key performance indicators (KPIs) is one of the most common reports for individual employees and teams, which reviews competencies across departments, identifies gaps and tracks progress at project level.

Data-driven decision-making is facilitated through these dashboards by allowing the employees to filter the data by department, role or time.

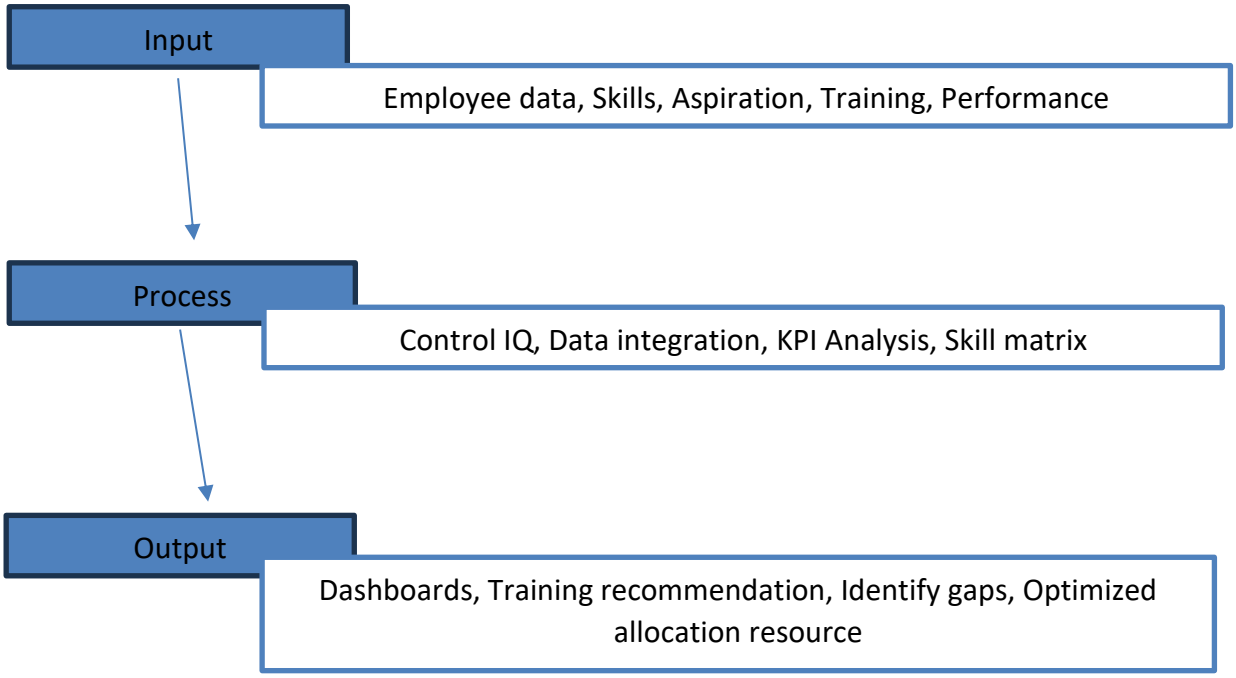



**Figure 2: Control IQ implementation processes**

### 3.4. Data analysis methods

The approach proposed: consolidated algorithms rely on real-data inputs to identify employee performance and their needs for upskilling and reskilling. The analysis and acquisition of skill process use a structured method by combining comparative assessments with machine learning methods ensuring reliability and transparency of result.

In the initial stage employee data is collected from multiple sources and is standardized to allow comparability across the departments, projects or roles, anonymized with GDPR guidelines. This phase

provides transparency, quality and integrity of data.

The second stage involve automation and machine learning analysis to identify career progression and patterns in workforce performance. In this phase the algorithms are used based on performance profiles and helps to anticipate potential stagnation or high-potential employees.

The next stage utilities the statistical corelation model, which align key performance indicators (KPIs) with employee performance. Overall performance outcomes are determined by the competency development to establish strength of associations.

Following this, and evolution analysis is generated within the HR department, which contains response time, employee satisfaction and training program effectiveness.

This approach concludes with a visualization report, where the Control IQ platform generates interactive dashboards outlining competency evolution, organizational trends and skill gaps. These dashboards offering HR managers strategic decision support and data-driven overview of employee's performance, facilitating continuous organizational improvement.

### 3.5. Hypothetical case example

To validate the applied effectiveness of the approach proposed, a hypothetical case example was initiated. No empirical data were collected, the methodological framework is conceptual, instead, represent the simulation of implementation of the Control IQ platform within a large company with more than 5,000 employees. The proposed case example highlights the contrasts between modern data analytical systems and traditional evaluation, demonstrating the quantifiable impact within the organization and employee performance.

Before the implementation of Control IQ platform, the company used traditional performance reviews, where employee receive feedback once in a year. This evaluation offered an insufficient developmental efficiency, where the training courses where not aligned with employees goals and were selected by the managerial judgment. Reflecting this component, company showed insufficiency in real-time visibility into workforce progression, aspirations and concluding in delayed project execution and ineffective distribution of resources. Facing these challenges, the organization reduced overall productivity and generated skill gaps.

After the implementation of Control IQ platform, same company with the same employees reflected a substantial modification. Each employee received an individualized digital identity, facilitating continuous monitorization of performance. This system introduced real-time activity and task progress monitoring, where completion tasks were reviewed for efficiency, accuracy and dedicated time to it, after that were compared between new hires and experienced employees to established operational metrics. Smaller and repetitive tasks were dynamically brought together, task categorization was improved, and complex assignments where individually monitored.

The company reflected a notable progress after the activation of the skill matrix functionality, supporting efficient professional aptitudes mapping, which were linked with company objective and correlated with performance indicators. Employees tasks where reassigned based on their knowledge and aptitudes, the estimated time to complete a task was dynamically recalibrated, and the automated functionality of the system, during downtime or training periods, reassigned pending tasks to employees with similar knowledge.

For each specific task, the platform implemented e-learning resources, procedures and tutorial modules that enables employees to consolidate and develop their knowledge. Based on their needs and expectations, training programs were personalized, allowing employees to request learning activities, which improved their fulfilment.

Beside this implementation, human interaction maintains its importance within the company culture, furthermore, regular one-on-one meetings with managers or supervisors where development goal and aspirations are discussed and their emotional state is validated, still holds a critical element.

After six months of implementation, the company observed considerable performance advancement. Task completion time decreased by 21%, skill gaps were preventively identified, and the projects

responsibility were distributed more efficiently. The training completion rate increased over 32%, and task redistribution during learning periods were allocated in a more efficient manner.

However, these quantifiable results confirm that the Control IQ platform supports a data-driven and HR environment workforce focussed, having the potential to contribute to organizational efficiency while supporting employee satisfaction and development.

**Table 1**

**The benefits of integrating Control IQ into HR departments**

| **Before control IQ** | **After Control IQ** |
|---|---|
| Annual evaluations | Real-time monitoring |
| General training | Personalized training |
| Lack of visibility | KPI updated in real time |
| Manual task allocation | Automatic task allocation |
| Decisions based on intuition | Evidence-based decisions |
| Feedback provided intermittently | Continuous feedback and performance updates |
| Higher vulnerability to data | Enhanced data integrity with audit standards |

### 3.6. Applied methodologies

The approach proposed integrated performance analysis withing the HR departments with a transformative approach.

In the first step, the system captures and processes sensitive employee information in accordance with GDPR regulations. Any data violation, misapplication or unauthorized transmission can generate ethical concerns and potential legal liabilities.

The second step depends on quality and reliability of the input data. Inaccurate, inconsistent or incomplete historical data can unbalance the department structures, this could lead to an inadequate evolution or managerial decision. To avoid these risks, algorithm calibration and continuous input validation are essential.

Another important consideration belongs to workforce perception. By utilizing this system, employees can elicit discomfort or scepticism or feel overly controlled. Furthermore, effective communication and involving them in the system implementation is essential.

Finally, the financial costs associated with implementing this digital platform represent a potential limitation, especially for small companies. The implementation process not only needs investment in technological infrastructure but also in process integration and staff training. For this reason, cost–benefit assessment should be ensured.

## 4. Conclusions

The deployment of digitalization and implementation of HR analytics in strategic planning mechanism harmonize organizational priorities with employees' desire outcome, facilitating performance evaluation and supporting planning competency building and continuous monitoring.

Highlighting and recognizing workforce strengths empowers strategic assignment of human resources in alignments with strategic organizational demands.

Automation, artificial intelligence and digital transformation represent multi-dimensional processes that incorporate reconfiguring and strengthening digital competencies. The investigated case study accentuates the key contribution of leadership and employee commitment to their tasks in maintaining profitability and company advancement.

Interactive dashboards and tracking in real time workforce development offer transparency regarding each employee impact across the organization in different projects and points out the impact of HR

decisions. Also, it is crucial that the analysed data be consistent, verifiable and accurate for transparent and relevant outputs.

The Control IQ system investigated in this paper plays a part in managerial tasks optimization, reduce manual workload and human error. Using interactive dashboards, it strengthens comprehensibility in real time monitoring, helping the company to identify key performance indicators. Also, the risk of personal data fraud remains vulnerable, the platform encourages risk prevention by detecting discrepancies and anomalies which may affect organizational performance.

In the larger scheme of digital transformation, integrating Control IQ helps companies to optimize resource allocation, analyse training effectiveness and link them with organizational KPIs and monitor performance. The implementation of this system through the company consolidates the relationship between HR leadership and financial processes, increasing accuracy, transparency and optimizes efficiency by reducing processing time which will shape the budget and cultivates evidence-based practices.

All these elements and practices offer an integrated overview of human resources capital securing the alignment with audit standards and internal procedures.

**References**

1. Popescu, N. (2025). Predictive analytics in human resources management: Evaluating AIHR's role in talent retention. *AppliedMath*, *5*(3), 99 MDPI. https://www.mdpi.com/2673-9909/5/3/99

2. Zhang, N., Sun, X., & Jin, C. (2025). Effects of electronic performance monitoring on employees' job performance: A social information processing perspective. *Behavioral Science,* 15(3), 256 MDPI. https://www.mdpi.com/2076-328X/15/3/256

3. Vuong, T. D. N., & Nguyen, L. T. (2022). The key strategies for measuring employee performance in companies: A systematic review. *Sustainability,* 14(21), 14017 MDPI. https://www.mdpi.com/2071-1050/14/21/14017

4. Ferrigno, G., Del Sarto, N., Piccaluga, A., & Baroncelli, A. (2023). Industry 4.0 base technologies and business models: A bibliometric analysis. *European Journal of Innovation Management, 26*(7), 502-526. https://doi.org/10.1108/EJIM-02-2023-0107

5. Murire, O.T. (2024). Artificial Intelligence and Its Role in Shaping Organizational Work Practices and Culture. *Administrative Sciences, 14*, 316 MDPI. Artificial Intelligence and Its Role in Shaping Organizational Work Practices and Culture

6. Gupta, R. (2024). Impact of Artificial Intelligence (AI) on Human Resource Management (HRM). *International Journal for Multidisciplinary Research, 6*, 10. IJRAR Research Journal

7. Yanamala, K.K.R. (2023). Transparency, Privacy, and Accountability in AI-Enhanced HR Processes. *Journal of Advanced Computing Systems, 3*, 10–18. Transparency, Privacy, and Accountability in AI-Enhanced HR Processes | Journal of Advanced Computing Systems

8. Bagas Ananta Aji, Disa Insanul Ikhlas, Intan Ratna Wati (2023). Navigating The Workforce Challenges and Skill Development in The Era of Industry 4.0. *Arthatama: Journal of Business Management and Accounting*, 30-37. https://journal.lifescifi.com/index.php/art/article/view/468/383

9. Leesakul, N., Oostveen, A., Eimontaite, I., Wilson, R., & Hyde, R. (2022). Workplace 4.0: Exploring the Implications of Technology Adoption in Digital Manufacturing on a Sustainable Workforce. *Sustainability,* 14(6), 3311. MDPI. https://www.mdpi.com/2071-1050/14/6/3311

10. Ada, N., Ilic, D., Sagnak. (2021). A Framework for New Workforce Skills in the Era of Industry 4.0. *International Journal of Mathematical, Engineering and Management Sciences*. 6 (3), 771 – 786. https://www.ijmems.in/cms/storage/app/public/uploads/volumes/46-IJMEMS-20-149-6-3-771-786-2021.pdf

11. Md. Tota Miah, Szilvia Erdei-Gally, Anita Dancs, Mária Fekete-Farkas (2024). A Systematic Review of Industry 4.0 Technology on Workforce Employability and Skills: Driving Success Factors and Challenges in South Asia. *Economies,* 12(2), 35. MDPI https://www.mdpi.com/2227-7099/12/2/35

12. Jiri Polivka & Zuzana Dvorakova (2020). Human Resources Readiness for Industry 4.0. *Journal of*

*Open Innovation,* 6(1), 3. MDPI. https://www.mdpi.com/2199-8531/6/1/3

13. Hana Gažová Adamková (2020). Industry 4.0 brings changes in human resources. *SHS Web of Conferences. 83, 1-7.* https://www.shs-conferences.org/articles/shsconf/pdf/2020/11/shsconf_appsconf2020_01016.pdf

14. Jakub Chán & Miluše Balková (2021). Digital Transformation in HR. *SHS Web of Conferences* 1-6. https://paperity.org/p/328664790/digital-transformation-in-hr

15. IBM. (n.d.). Artificial Intelligence for Human Resources. https://www.ibm.com/think/topics/ai-in-hr

16. Siraj, N., & Hágen, I. (2023). Performance management system and its role for employee performance: Evidence from Ethiopian SMEs. *Heliyon*, 9(11), e21819. https://doi.org/10.1016/j.heliyon.2023.e21819

17. Oncioiu, I., Kandzij, V., Petrescu, A.-G., Panagoreț, I., Petrescu, M., & Petrescu, M. (2021). Managing and measuring performance in organizational development. *Economic Research-Ekonomska Istraživanja,* 35(1), 915-928. https://hrcak.srce.hr/file/435653

18. Dhawale, S., & Lohar, M. (2020). An analysis of human resource skill gap through HR matrix: A case study. *International Journal of Disaster Recovery and Business Continuity*, 11(3), 2472–2485. https://www.researchgate.net/publication/354780152_An_Analysis_Of_Human_Resource_Skill_Gap_Through_Hr_Matrix-A_Case_Study

19. Paritkar, M. R. P. (2016). Enhancing performance through skill matrix. *Anveshana's International Journal of Research in Regional Studies, Law, Social Sciences, Journalism and Management Practices*, 1(5), 27–30. https://publications.anveshanaindia.com/wp-content/uploads/2016/06/PERFORMANCE-THROUGH-SKILL-MATRIX.pdf

20. Ali, M. M., Qureshi, S. M., Memon, M. S., Mari, S. I., Ramzan, M. B., (2021). Competency framework development for effective human resource management. *SAGE Journals*, 11(2), 1–12. https://doi.org/10.1177/21582440211006124

21. Jooss, S., Collings, D. G., McMackin, J., Dickmann, M., (2024). A skills-matching perspective on talent management: Developing strategic ability, *Human Resource Management*, 63(2), 345–360. https://doi.org/10.1002/hrm.22192

22. World Economic Forum. (2023). The Future of Jobs Report 2023. Geneva: World Economic Forum. https://www3.weforum.org/docs/WEF_Future_of_Jobs_2023.pdf

23. Yatskuliak, O. (n.d.). Data-Driven Decision Making: The Key to Business Success. *LinkedIn* Pulse https://www.linkedin.com/pulse/data-driven-decision-making-key-business-success-orest-yatskuliak-dnxhf

24. Davenport, T. H., et al. (2012). Data Driven Strategy, *Strategy & Leadership,* 42 (4), 45–50. DOI https://www.emerald.com/sl/article-abstract/42/4/45/342330/How-strategists-use-big-data-to-support-internal?redirectedFrom=fulltext

25. Wulff, K., Finnestrand, H., (2023). Data Driven Information for action. *Gruppe. Interaktion. Organisation. – Zeitschrift für Angewandte Organisationspsychologie (GIO),* 54, 65-33. https://link.springer.com/article/10.1007/s11612-023-00666-9

26. Hevner, A. R., March, S. T., Park, J., & Ram, S. (2004). Design science in information systems research. *MIS Quarterly*, 28(1), 75–105. https://doi.org/10.2307/25148625

27. Indrasari, M., & Pamuji, E. (2024). Enhancing Employee Performance through Strategic Artificial Intelligence Initiatives. *Journal of Business Management and Economic Development*, 2(1), 383–396. https://doi.org/10.59653/jbmed.v2i01.548

28. Google People Analytics. (2019). Case study: how Google uses People Analytics. *Sage*. https://www.sage.com/en-au/blog/case-study-how-google-uses-people-analytics/

29. Davenport, T. H., Harris, J., & Shapiro, J. (2010). Competing on Talent Analytics. *Harvard Business Review,* 52-58. https://hbr.org/2010/10/competing-on-talent-analytics

30. Changkakati, B., & Das, C. (2020). Data Mining Techniques In HR Analytics: A Review Of Domain Specific Concepts And Technicalities, *International Journal of Scientific & Technology Research*, 9(3), 4358–4362. https://www.ijstr.org/final-print/mar2020/Data-Mining-Techniques-In-Hr-Analytics-A-Review-Of-Domain-Specific-Concepts-And-Technicalities.pdf

31. Saxena, M., Bagga & T., Gupta, S., (2021). Fearless path for human resource personnel's through

analytics: a study of recent tools and techniques of human resource analytics and its implication**,** *International Journal of Information Technology*, 13, 1649-1657. https://link.springer.com/article/10.1007/s41870-021-00677-z

32. Shaik, K., Rao, G. S., Babu, M., Reddy, L., & Ahmed, A. A., (2020). Predictive Modeling for HR Decision-Making: A Study of Employee Turnover, *Journal of Marketing & Social Research*, 2(4), 92–98. https://jmsr-online.com/article/predictive-modeling-for-hr-decision-making-a-study-of-employee-turnover-205/

33. Nozari, S., Zahed, R. K., Ponkratov, V. V., & Kostyrin, E. V., (2022). Artificial Intelligence Models and Employee Lifecycle Management : A Systematic Literature Review, *Organizacija*, 181-198. https://reference-global.com/article/10.2478/orga-2022-0012

34. Henriques, P., Simões, P., & Loureiro, N. S. (2021). Impact of GDPR on Access Profile Management in an HR Information System. In A. Rocha, C. Ferrás, P. C. López-López, & T. Guarda (Eds.), Information Technology and Systems, *Advances in Intelligent Systems and Computing,* 1130, 96-107 . https://link.springer.com/chapter/10.1007/978-3-030-68285-9_10

35. Chatterjee, S., Chaudhuri, R., Vrontis, D., & Siachou, E. (2022). Examining the dark side of human resource analytics: An empirical investigation using the privacy calculus approach. *International Journal of Manpower*, 43(1), 52–74. https://doi.org/10.1108/IJM-02-2021-0087

36. Zhang, L., & Yencha, C. (2022). Examining perceptions towards hiring algorithms. *Technology in Society*, 68, 101848. https://doi.org/10.1016/j.techsoc.2021.101848

37. Agolla J. E. (2018). Human capital in the smart manufacturing and industry 4.0 revolution. In *Digital transformation in smart manufacturing,* 41–58. https://www.intechopen.com/books/digital-transformation-in-smart-manufacturing/human-capital-in-the-smart-manufacturing-and-industry-4-0-revolution

38. Croitoru, I. M., Dragomir, L., Imbrescu, C.-M., Dragan, P.-P., & Chivu, M. (2025). Indicators and Tools for Measuring Performance in the Public Education System: Bibliometric Perspectives on BSC, KPI, SPM, M&E, and EPSA. *Businesses, 5*(3), Article 42. https://doi.org/10.3390/businesses5030042

39. Peng, J. (2022). Performance Appraisal System and Its Optimization Method for Enterprise Management Employees Based on the KPI Index. *Discrete Dynamics in Nature and Society*, https://doi.org/10.1155/2022/1937083

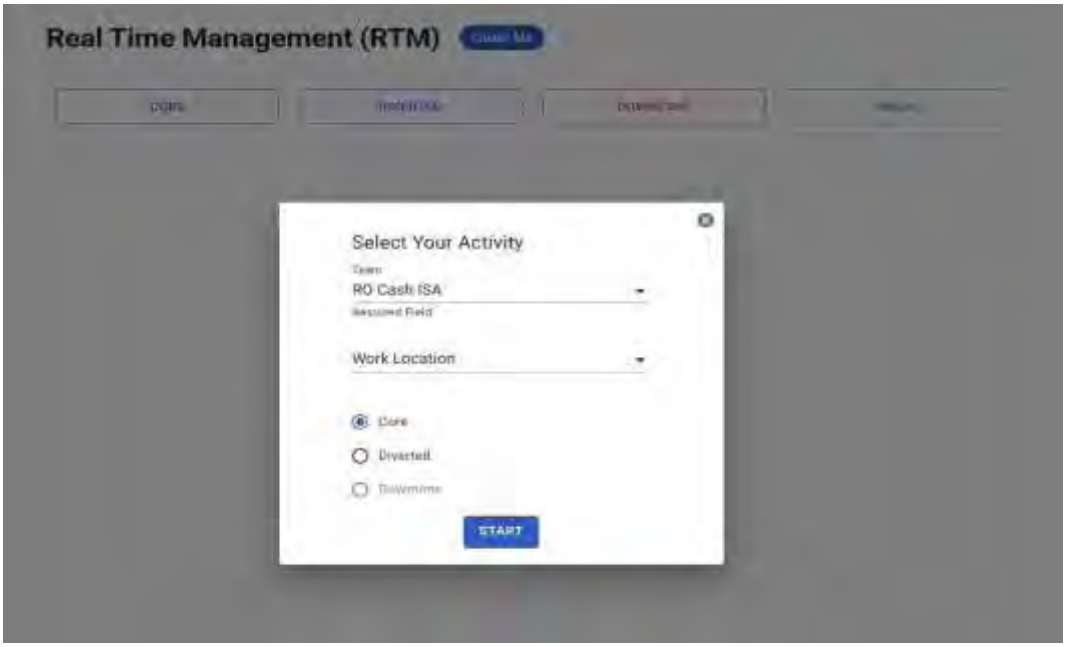
40. Nguyen, T. M., Malik, A., (2022). Employee acceptance of online platforms for knowledge sharing: exploring differences in usage behaviour*, Journal of Knowledge Management 26*, 1985–2006. https://www.emerald.com/jkm/article-abstract/26/8/1985/267309/Employee-acceptance-of-online-platforms-for?redirectedFrom=fulltext

## Appendix

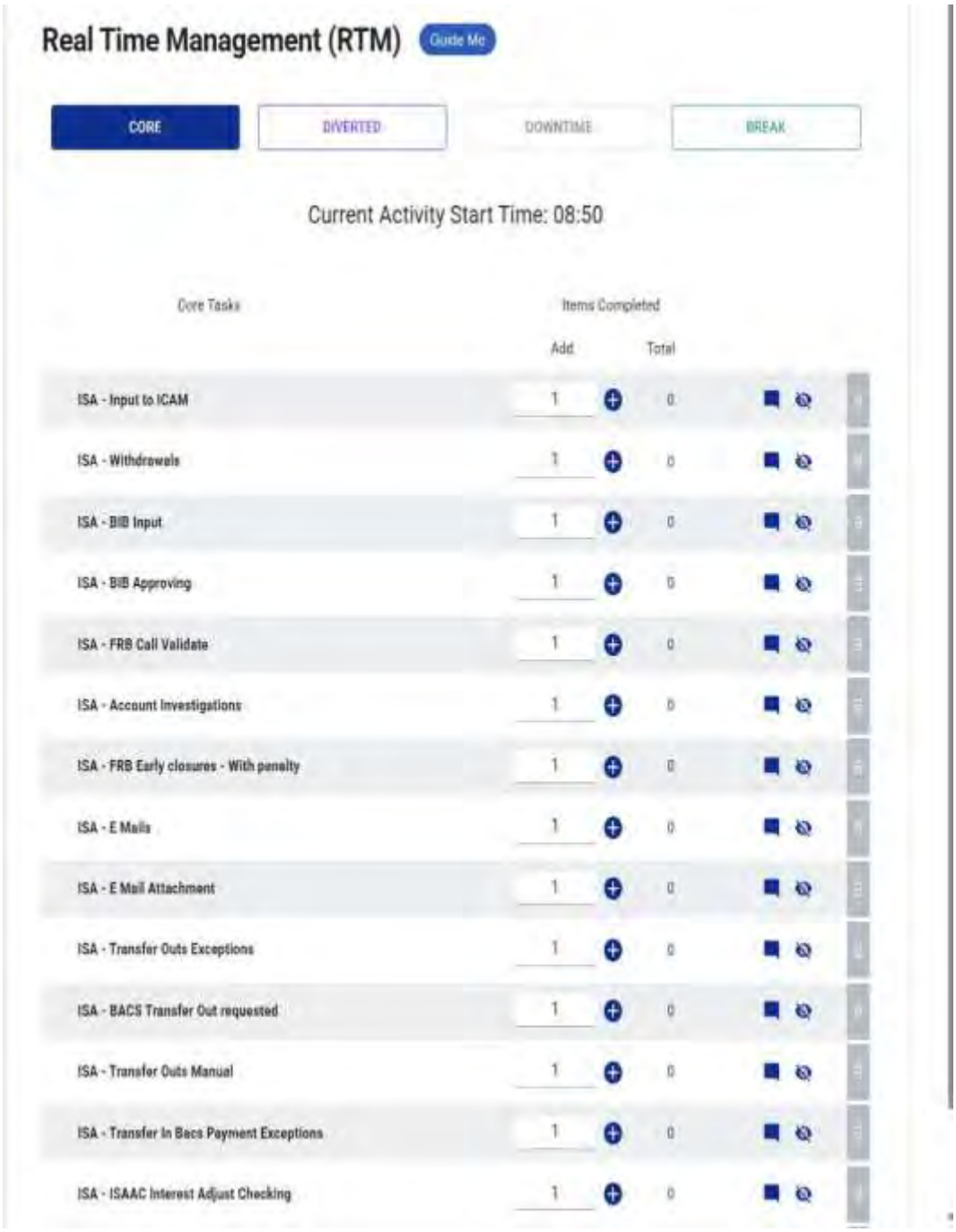
### Control IQ Interface – Login



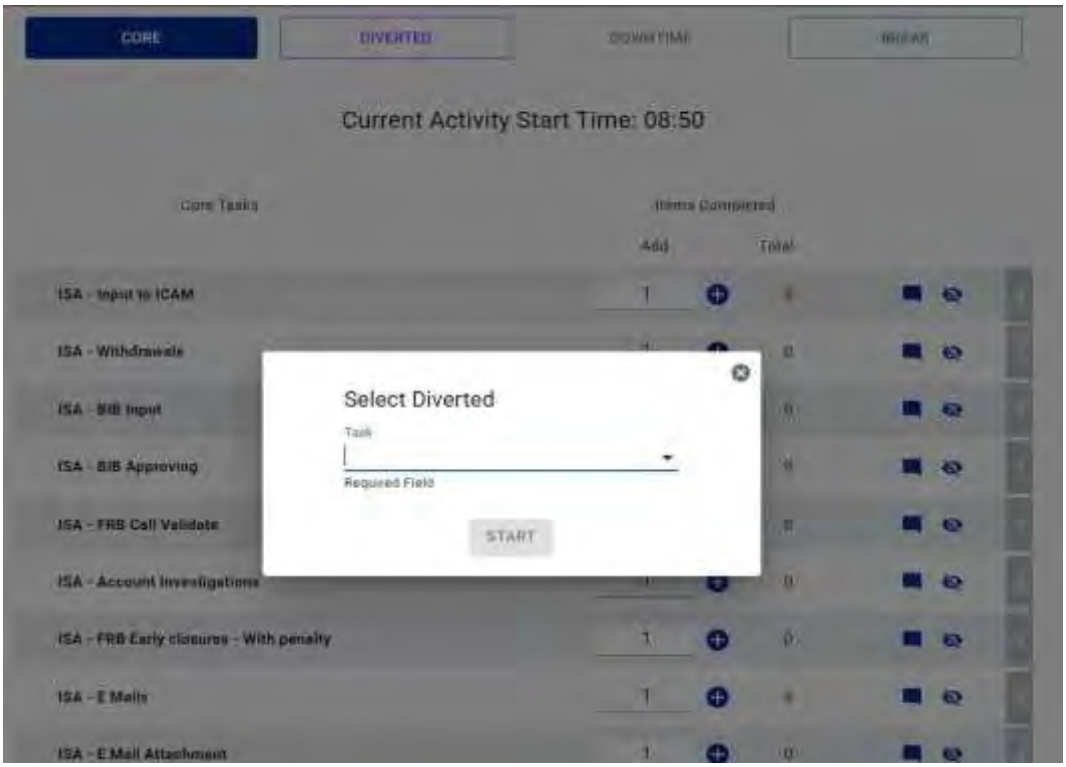

### Control IQ Interface – Location options



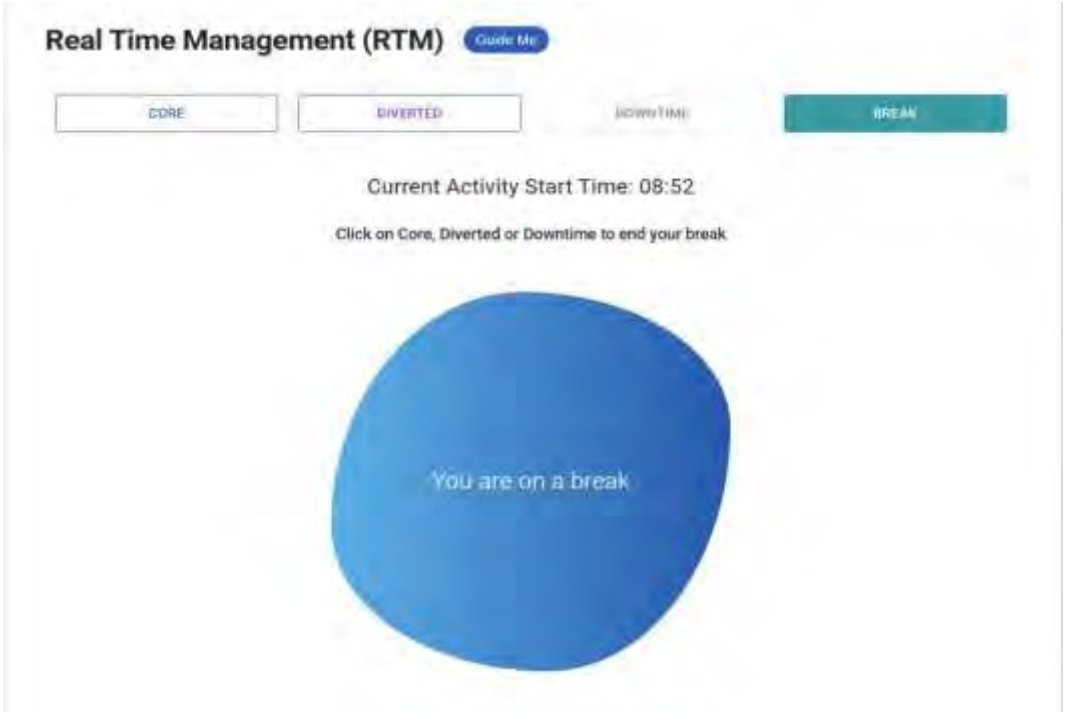
**Control IQ Interface – Tasks**



**Control IQ Interface – Diverted Tasks**



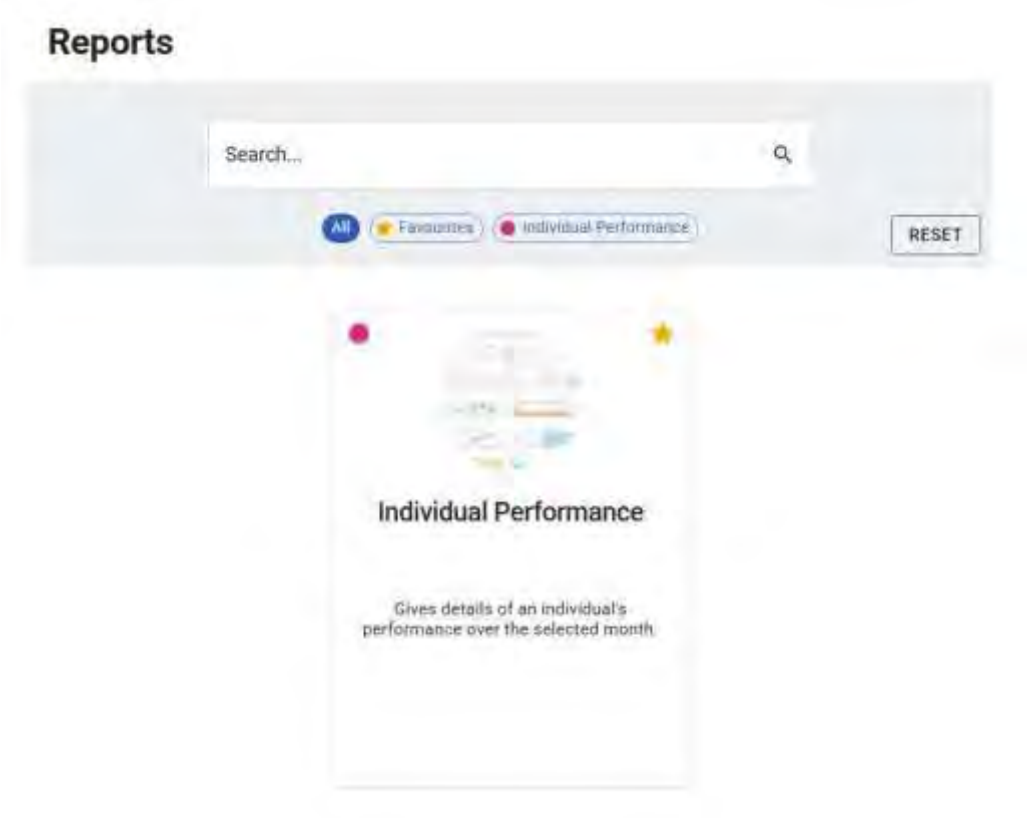

**Control IQ Interface – Break option**

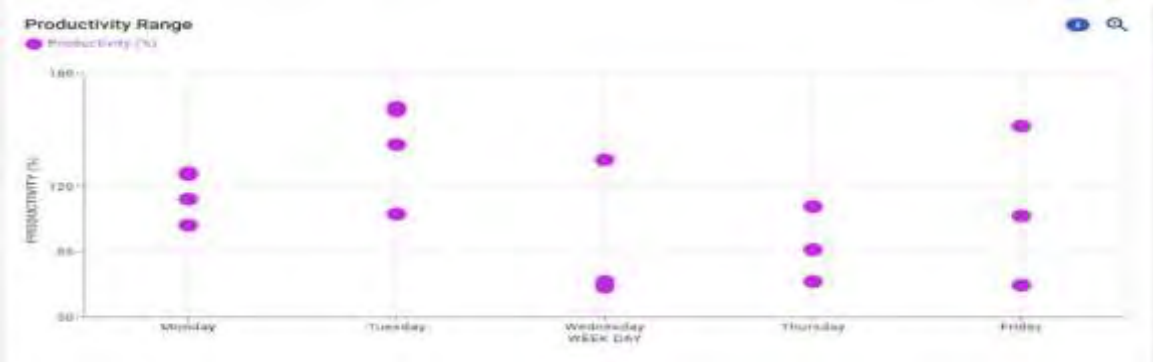


**Control IQ Interface – Manager Interface**

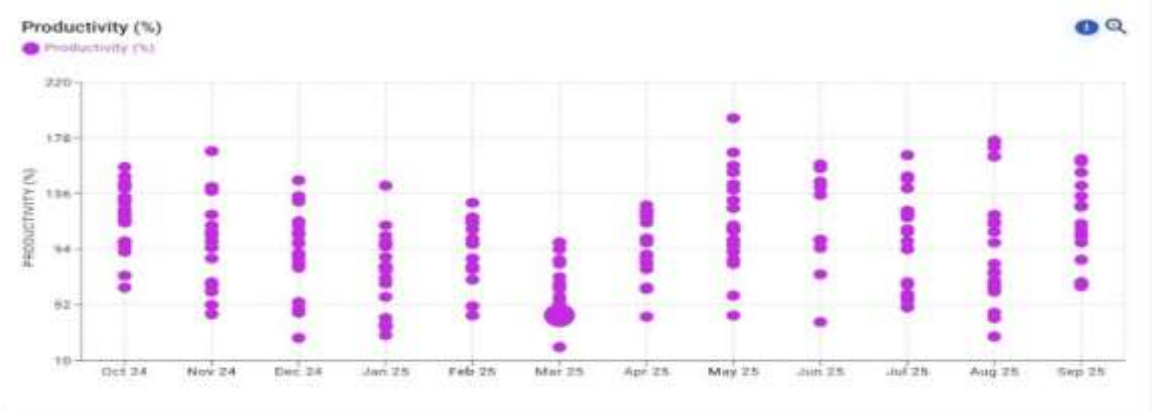


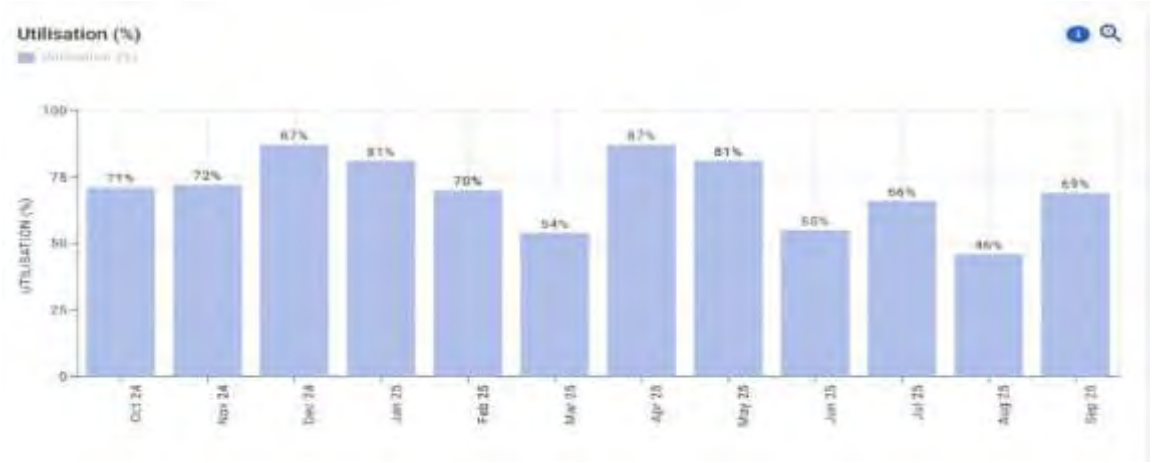

**Control IQ Interface – Monthly Reports**

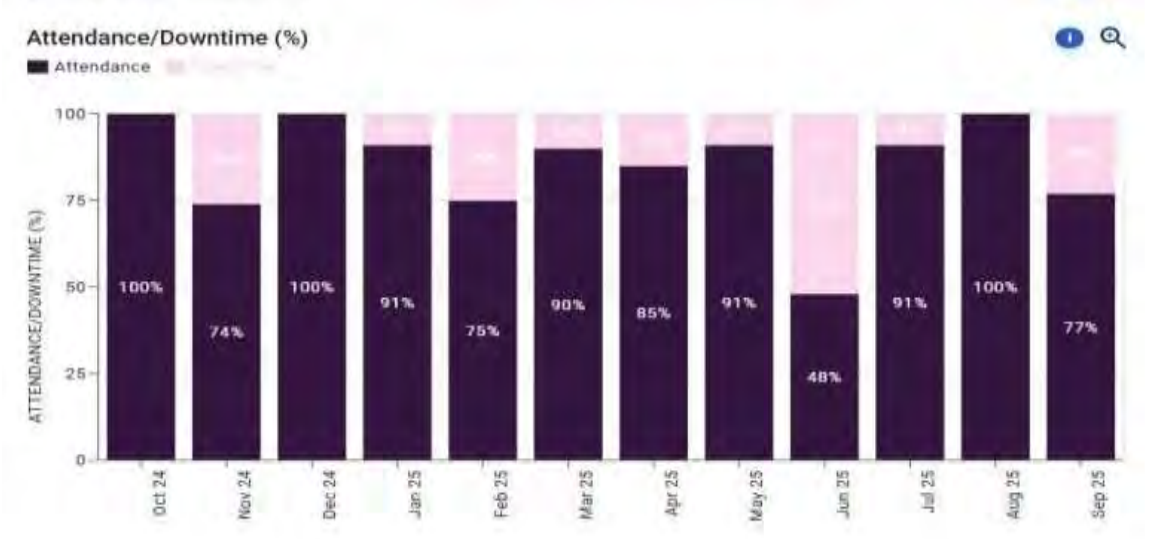



Productivity Range
PRODUCTIVITY (%)
Monday
Tuesday
Wednesday
Thursday
Friday
WEEK DAY


Core Diverted Work
Meeting/Buzz
DIVERTED TIME (HOURS)
UTILISATION (%)
DAY


Productivity (%)
PRODUCTIVITY (%)
Oct 24
Nov 24
Dec 24
Jan 25
Feb 25
Mar 25
Apr 25
May 25
Jun 25
Jul 25
Aug 25
Sep 25

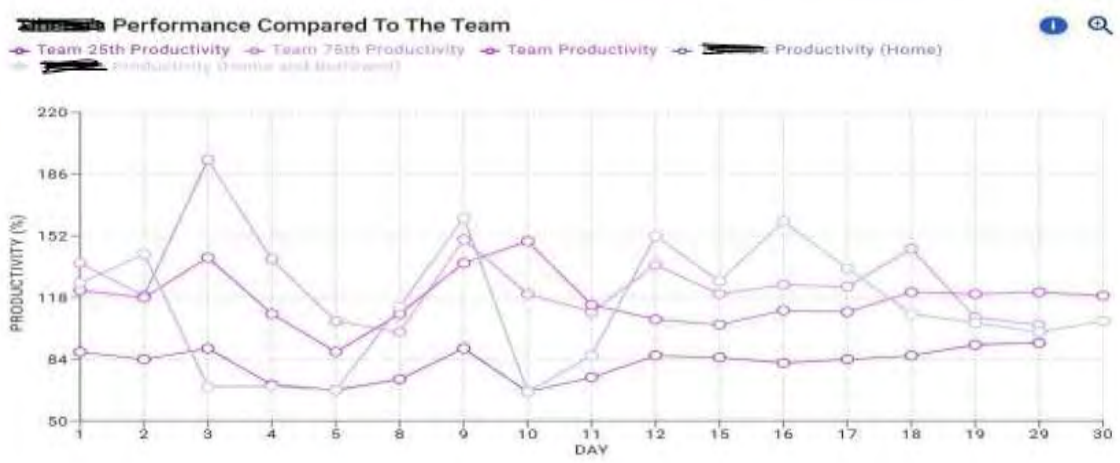

Utilisation (%)
UTILISATION (%)
100
75
50
25
0
71%
72%
87%
81%
70%
54%
87%
81%
55%
66%
46%
69%
Oct 24
Nov 24
Dec 24
Jan 25
Feb 25
Mar 25
Apr 25
May 25
Jun 25
Jul 25
Aug 25
Sep 25


Attendance/Downtime (%)
Attendance
ATTENDANCE/DOWNTIME (%)
100
75
50
25
0
100%
74%
100%
91%
75%
90%
85%
91%
48%
91%
100%
77%
Oct 24
Nov 24
Dec 24
Jan 25
Feb 25
Mar 25
Apr 25
May 25
Jun 25
Jul 25
Aug 25
Sep 25


How Did [redacted] Perform In Other Teams?
RO Cash ISA
Productivity (%)
114%
Utilisation (%)
59%
Time Spent (%)
100%

| | % | Home Team (%) | Compare To Tea... | Last Month (%) | Compare To Las... |
|---|---|---|---|---|---|
| Productivity | 114 | 116 | -3 | 95 | 18 |
| Utilisation | 69 | 55 | 14 | 46 | 23 |
| Attendance | 77 | 76 | 1 | 100 | -23 |
| Downtime | 23 | 24 | -1 | 0 | 23 |

| Core Task | Team | Skill Level | Work Out (Units) | Work Out (Hours) |
|---|---|---|---|---|
| ISA - Account Inves... | RO Cash ISA | 0 | 20 | 5.0 |
| ISA - BIB Approving | RO Cash ISA | 0 | 32 | 1.1 |
| ISA - BIB Input | RO Cash ISA | 0 | 376 | 25.1 |
| ISA - Cheque reacti... | RO Cash ISA | 0 | 17 | 1.4 |
| ISA - E Mail Attach... | RO Cash ISA | 0 | 87 | 0.7 |
| ISA - E Mails | RO Cash ISA | 0 | 125 | 10.4 |
| ISA - FRB Call Valid... | RO Cash ISA | 0 | 45 | 1.5 |
| ISA - Input to ICAM | RO Cash ISA | 0 | 233 | 3.9 |
| ISA - Transfer Outs ... | RO Cash ISA | 0 | 369 | 23.3 |
| ISA - Withdrawals | RO Cash ISA | 0 | 154 | 20.5 |




Monday
Tuesday
Wednesday
Thursday
Friday
Saturday
Sunday
01
02
03
04
05
06
07
Flex: -0.1
Flex: -0.1
Flex: -0.5
Flex: 0.1
Flex: -0.1
08
09
10
11
12
13
14
Prod: 182%
Prod: 66%
Flex: 0.3
Flex: -0.3
Flex: 0.0
Flex: 0.2
15
16
17
18
19
20
21
Flex: 0.2
Flex: 0.0
Flex: -0.2
22
23
24
25
26
27
28
PT: 7.0
PT: 7.0
PT: 7.0
PT: 7.0
PT: 7.0
29
30
Flex: 0.0
Flex: -0.1

ISSN (Online): 2815-5084

INTERNATIONAL SCIENTIFIC AND PRACTICAL CONFERENCE ON HUMAN RESOURCE MANAGEMENT
DOI: 10.56065/HRM/2026.34, pp. 34 – 45

7th edition, 3 October 2025
University of Economics-Varna

# Human resource management in the digital age – transformation of leadership approaches and motivational catalysts

**Kiril RADEV**[1]

[1] Associate Professor PhD, New Bulgarian University, Sofia, Bulgaria, genrad@abv.bg

**JEL: O14, O15, M12, M54, E13**

**Key words:**
cross-cultural communication, Industry 4.0 (HR4.0), organizational culture, artificial intelligence, digitalization, transformational leadership.

**Abstract**

In connection with global digitalization and the implementation of the tools and methods of the fourth industrial revolution (IR 4.0) in production processes, it is necessary to make significant changes in the methods and approaches to human resources management. In this context, the report presents an author's study of the processes of transformation of human resources management and behavior in the digital era (HR4.0). The object of the study are large organizations from the manufacturing sector and students from leading higher education institutions in Bulgaria. The scope of the study is limited to the processes of transformation of leadership approaches and motivational catalysts, given the inevitable changes in the perceptions and value systems of generations, cross-cultural communications and cultural paradigms. For this purpose, a scientific toolkit was used, including analytical (content analysis, document research, survey methods and interview methods, comparative analysis), statistical and graphical methods. As a result, conclusions and recommendations with scientific and practical contribution for changes in the methods and leadership approaches in human resources management, in the context of the goals and tools, the business environment and the technical infrastructure of IR 4.0, respectively HR 4.0 and the global prospects of the 21st century.

**Published by University of Economics – Varna**

*Citation:* Radev, K., (2026). Human resource management in the digital age – transformation of leadership approaches and motivational catalysts. *Proceedings from 7th International Scientific and Practical Conference on Human Resource Management (ICHRM).* University of Economics – Varna, pp. 34 – 45. DOI: 10.56065/HRM/2026.34

## 1. Introduction

For the first time, the term „Industry 4.0“ (IR4.0) was mentioned at the fair in Hanover in 2012, within the framework of the presentation of a German project in the field of development and application of high technologies in industry. The abbreviation „4.0“ is used in the sense of the „fourth industrial revolution“, the beginning of which was set in 2000 and is considered a „revolution“ because it is based on the achievements of the third industrial revolution, and provides for the additional inclusion in production processes of modern achievements in the field of:

- information and communication technologies;
- cyber-physical systems;
- storage and processing of huge data sets located in the so-called cloud systems;
- systems for modeling, simulation and virtual presentation of information;
- improved tools for interaction between people and computers.

In terms of organization, the development of IR4.0 is carried out by the German associations Bitkom, VDMA and ZVEI. They develop strategies and programs for IR4.0, in the context of the capabilities of the mechanical engineering, electrical engineering and electronics industries and the information and computing technology sector in Germany. They work in close cooperation with the International Electrotechnical Commission. For its implementation, the implementation of a set of systematically linked goals in the following eight areas is envisaged:

1. Standardization – ensuring compatibility for the purposes of network interaction and network integration;
2. Management of complex systems – using models for the automation of activities by integrating the digital and real world;
3. Building a broadband information system – for the purposes of processing and storing a database;
4. Security – ensuring information protection;
5. Work organization and workplace design – with an emphasis on planning and decision-making processes in the conditions of „Industry 4.0“, also taking into account information security measures;
6. Basic/initial and additional training – in terms of content and organization;
7. Legal and regulatory framework – rules for concluding contracts, assuming and fulfilling responsibilities, etc.;
8. Resource efficiency – with an emphasis on optimizing the use of resources.

The implementation of IR4.0 tools in production processes requires a transformation of management approaches, given the inevitable changes in the behavior, skills, communication and values of personnel. For this purpose, it is recommended to apply the principles and tools of HR4.0 (Munsamy et al., 2019; Verma et al., 2020), in order to ensure adequate adaptation and commitment of employees to the goals of IR 4.0 (Kaur, & Singh, 2021).

Given the above, the main objective of the study is: To identify the main aspects of human resource management and behavior for the purposes of Industry 4.0.

Within the main objective, the following scientific tasks have been identified:

- analysis of the role of the human factor in organizational development and excellence, in the context of the goals of Industry 4.0 and global digitalization;
- derivation of the interrelationships between the characteristics of the human factor and total quality management;
- analysis of the tools for the influence of management on human resources, given the specifics of Industry 4.0 and global digitalization.

In the context of the above, the study aims to answer the following questions:

1. What are the main models and measures of human resource management in the digital age?
2. In the context of global digitalization and business integration, what are the barriers, opportunities and prospects for the transformation of human resource management – management methods and approaches, skills, values and cross-cultural communication?
3. What are the roles of empathy in cross-cultural management in the context of Industry 4.0?

## 2. Literature Review and Hypotheses Development

### 2.1. Digital transition – transformation of human resources

According to Cheese, human resource management should provide a system of policies, an integrated information system with up-to-date data for each of the personnel, and opportunities for management flexibility (Cheese, 2008). Ulrich recommends that for successful human resource management in a dynamically changing environment, strategies and methodologies for assessing employee performance and development opportunities in a constantly changing organizational culture should be developed (Ulrich et al., 2012).

The processes of transformation of organizations towards the digitalization of production and administrative processes will have an impact on the requirements for knowledge, skills, values and behaviors relevant to the environment (Chernyak-Hai & Rabenu, 2018). In addition, the possibility of remote work

should be taken into account (Kämpf-Dern & Konkol, 2017; Schultz, 2021), the planning and management of which should take into account regulatory provisions, as well as organizational and administrative ones (De Bruyne & Gerritse, 2018).

In the interaction of IR.40 and HR4.0, intercultural communication is a key tool for achieving cultural-psychological collaboration in international teams in order to build formal and informal relationships adequate for the purposes of organizational development. For its successful application, the role of empathy as a strategic management function should also be taken into account (Sattorovich 2020).

### 2.2. Empathy and cross-cultural transformation

Empathy is a strategic management function that, in the conditions of digital transition, should ensure a high level of commitment and loyalty of the staff. With its help, the goals of achieving the intentions of the management will be perceived more correctly (Kolko 2014). Empathy should also be an integral part of influence strategies and the master plan for achieving higher creative activity and innovation, expanding the assortment structure, improving quality and increasing the competitiveness of organizations (Bag 2020). Transformational leadership should be professionally applied to their implementation.

### 2.3. Hypotheses

The study aims to prove the following hypotheses:

1. The Fourth Industrial Revolution is a vision, approach and tool for the transition to a global transformation of production processes through the application of digital technologies and infrastructure.
2. Industry 4.0 is a prerequisite for a revolution in management paradigms and models in the field of sustainable development, business and public management.
3. The transition to Industry 4.0 is associated with the transformation of professions, markets, target groups, consumer preferences, quality assurance methods, regulatory acts in the field of economic activities and international relations, public values and social policies.
4. The successful transition of business organizations to Industry 4.0 requires professional transformational leadership, implementation of total quality management, application of flexible motivational tools.
5. Achieving organizational excellence in the conditions of Industry 4.0 is a function of perfect human resources management.

## 3. Material and Methods

### 3.1. Theoretical Framework

In theoretical terms, the theoretical and theoretical-applied aspects of human resources management in the context of digital transition are studied. Emphasis is placed on the methods for building and transforming organizational culture, the determinants of cross-cultural communications, organizational behavior, industrialization and digitalization. The role and application of empathy in the processes of building HR.40. is considered in the context of strategic management approaches and the assessment of their implementation. Scientific literature and publications in periodicals, information from the World Economic Forum (WEF 2019; WEF 2025), public national and international institutions were used.

### 3.2. Research Methodology

To achieve the objectives of the study, analytical (content analysis, document analysis, interview methods, survey methods), statistical and graphical methods were used, as well as:

- Fundamental methods: Conceptual approach Descriptive research design, Case study, Causal research design, Diagnostic research design, Sequential research design, Field research design, Systematic review, Survey and
- Applied methods: Technological, Scientific: Action Research, Causal research, Classification research,

Comparative research, Cross-sectional research, Deductive research, Exploratory research, Flexible research, Inductive research, Mixed research, Policy research, Qualitative research.

For the application of the scientific toolkit, a study of scientific literature and information from business organizations was conducted, surveys were prepared and questionnaires and interviews were conducted among management and personnel in business organizations, as well as among students from leading universities in Bulgaria.

## 4. Aspects of the transition to Industry 4.0

### 4.1. Aspects of the transition to Industry 4.0 in France, Finland and the USA

**France**

In 2015, an initiative was launched in France – Industrie du futur (Industry of the Future), which aims to modernize and transform enterprises in their transition to Industry 4.0. The initiative draws attention to the most essential components of the transition, or rather the transformation of business organizations, in the context of the goals of Industry 4.0, namely: logistics, national programs to support business structures, training and retraining of personnel, tools to promote the development of the industry through European and international cooperation.

In the period 2016 – 2021, a number of regulatory documents were adopted at the government level, aimed at promoting "the openness and circulation of data and knowledge and facilitating citizens' access to digital technologies", as well as accelerating the implementation of Industry 4.0 in companies.

The main barriers to the transition to Industry 4.0 in the French industrial sector are:

- regulatory provisions that prevent companies from investing in information and communication technologies;
- insufficient number of personnel trained to work with digital technologies;
- absence of adequate educational programs in educational institutions to acquire knowledge and skills for working in the conditions of Industry 4.0;
- inconsistency of the educational system with the requirements of the labor market;
- traditionally, organizations adhere to models of organizational construction incompatible with the goals and tools of Industry 4.0;
- absence of teamwork habits in organizations;
- presence of trade union resistance to the implementation of technologies that replace human participation in processes;
- not all companies appreciate the benefits of development activities and, as a result, their management does not build organizational structures for research and development activities.

Given the above, to provide opportunities for the implementation of digitalization in French industry, respectively. in SMEs, a number of projects and regulatory instruments have been developed at the government level, including:

- projects: „Support for investments in the transformation of the industry of the future“ and „Support for digital literacy and dissemination within the framework of the „Artifcial Intelligence Booster“„;
- tax breaks are provided for research and development activities, digital services, SMEs and innovative start-ups;
- taxes and fees for production organizations have been reduced;
- tax rates for SMEs have been reduced;
- expert assistance for SMEs from IT consulting companies, state and local research centers has been provided;
- projects for international cooperation, etc. are being developed permanently.

**Finland**

In 2015, the Finnish government adopted a strategy for the digitalization of public services and Industry

4.0, and in 2017 a roadmap for the integration of artificial intelligence into Finnish society and business was adopted.

The main prerequisites and drivers of the transition to Industry 4.0 in Finland are:

- political support for economic development in the information and telecommunications, healthcare and engineering sectors;
- the use of modern digital technologies, such as artificial intelligence, the Internet of Things, cyber-physical systems and big data;
- a highly educated workforce/human capital with digital skills and IT specialists;
- a national curriculum for basic education that includes coding and programming from the very beginning of school education.
- the main barriers to the implementation of the transition to Industry 4.0 include:
- difficulties in establishing SMEs in international markets, due to the absence of a culture and resources for venture capital investments;
- lack of innovation-oriented start-ups in the manufacturing industry;
- the field of new technologies is very broad and scattered, often without standards;
- lack of young people for future technological development, creating a gap between the skills of traditional manufacturing workers and new skills needed in the Industry 4.0 workplace;
- companies that join the implementation of Industry 4.0 do not have examples of best practices from successful organizations.

**USA**

In the context of the successful and timely implementation of the transition, governments in the United States are systematically developing and implementing policies to motivate large companies on their path to achieving the goals of Industry 4.0. In this regard, corporate tax rates have been reduced, the amount of tax credits and investments in research and development has been increased. In this regard, special attention is paid to: digitalization and virtual integration, the implementation of artificial intelligence, the collection and analysis of large data sets, knowledge management, talent development, the integration of organizations along the supply chain, etc.

The following are significant challenges and barriers facing state and business management in the transition to the conditions of Industry 4.0:

- difficulties and lack of established procedures regarding the processes of implementing artificial intelligence;
- still insufficiently effective and efficient data storage and processing;
- lack of guarantees that smart factories and industrial products will not pose a risk to the environment or personnel;
- lack of applicable policies and techniques for standardizing and integrating digital tools;
- insufficient skills to work with complex production systems;
- fear of job losses;
- need for large investments.

### 4.2. Industry 4.0 and the transition to achieving sustainable development in the 21st century

The current sustainable development goals for the period up to 2030 have been adopted by the United Nations (UN) and are recorded in the „2030 Agenda for Sustainable Development“, adopted on 25 September 2015. It is seen as a global framework for achieving sustainable development in the period up to 2030.

The interrelationships between the goals of Industry 4.0 and the 2030 Agenda for Sustainable Development are expected to contribute to achieving higher competitiveness of the EU by improving the national competitive advantages of each Member State. The global competitiveness index will be used to assess the degree of implementation of the goals, as well as two of the indicators for the development of national economies approved by the World Economic Forum:

- Gross domestic product per capita (at market exchange rates);
- Share of mineral exports in total exports of goods and services.

To optimally measure achievements in sustainable development, in 2011 the World Economic Forum proposed that the indicator be modified into a „global sustainable competitiveness index". The philosophy of the proposal is based on the understanding that the factors of sustainable development are people and the environment in which they live. To this end, the assessment of development must necessarily take into account the degree of realization of social and environmental sustainability.

The interrelationships between the goals of Industry 4.0 and the 2030 Agenda for Sustainable Development are expected to provide opportunities for higher competitiveness of EU countries. To this end, it is necessary to consider national digitalization programs and „Industry 4.0" in the context of the goals and strategies for sustainability of national economies. All economic sectors should be included in their scope. For each of them, a forecast and analysis of the benefits and threats (by sector), respectively. for the economic results and stability of national economies should be made. In a substantive aspect, the above circumstances are relevant to the management of sustainable development with the tools of transformational leadership.

With the transition from one era of industrial development to another, management paradigms and methods are necessarily subject to rethinking, adaptation and development in order to guarantee the successful achievement of the updated goals of organizations, in the context of the new characteristics of the business environment.

In this regard, the transition to Industry 4.0 requires rethinking and adapting the essential features of transformational leadership and existing models for its applicability.

Unlike previous industrial revolutions, the goals of Industry 4.0 will be achieved in the conditions of an aggressive and dynamic global environment, which requires the development of new methods for managing group dynamics, teamwork, motivation and organizational development.

It is also necessary to adapt the methods for: strategic management, business analysis, financial management, quality management, organization design, building and maintaining organizational culture and behavior, change management, digital entrepreneurship, etc. Special attention should also be paid to the role of empathy in human resource management, including talent and human capital. This circumstance argues for the rejection of transactional leadership in the context of the transition to a digital industry. The main arguments for this goal are related to the qualities and approach of leaders, with the help of which optimal continuity and minimal resistance should be ensured in the implementation of changes.

### 4.3. Industry 4.0, human factor and organizational excellence

As stated above in the text, the management of economic and public activities in the 21st century will be based on paradigms, methods and approaches, which must necessarily be in collaboration with the goals and tools of Industry 4.0. In addition, with their help, organizations will strive to achieve sustainable development, respectively. optimal competitiveness.

Given the specifics of planning and implementation of the above activities, the human factor is identified as the main tool in the processes of transformation and achieving organizational excellence. Therefore, it is an object and a significant tool for achieving the goals of Industry 5.0.

In the context of the thesis of this study, the hypothesis is formulated: To achieve organizational excellence in the transition to Industry 4.0, it is necessary to achieve excellence in human resource management as a priority.

In the context of its proof, the main directions and tools for achieving excellence in human resource management in the conditions of Industry 4.0 are identified. The most important of them include:

- strategic management;
- business intelligence;
- knowledge management;
- quality management;
- organizational culture and behavior.

All of them should be considered in a systematic relationship, in a long-term perspective, and a systematic approach should be applied to their management.

As a concept, business intelligence was introduced in 1989 by Howard Dresner. He sees it as "a set of concepts and approaches that, in collaboration with information systems using real data, create conditions for improving decision-making conditions". Its implementation in most cases requires a transformation of production systems, standardization, organizational structure and approaches to human resource management – with a main emphasis on leadership approaches, motivation, conflict resolution, selection, training and retention of personnel, adequate development and implementation of knowledge management policy. The correct design of organizational structures and positions is also important for providing opportunities for talent development and the transformation of human resources into human capital.

In the context of the conditions of transition to Industry 4.0, organizations should develop a knowledge management substrategy, with the help of which they can provide opportunities for the sustainability of personnel knowledge and skills regarding methods and processes for:

- conducting organizational self-assessment;
- assessing the environment, resources and tools for achieving competitive advantages;
- protecting data and information.

To achieve excellence in human resources management during the transition to Industry 4.0, the quality management system (QMS) also plays an essential role. Therefore, it is recommended that it be built on the basic principles of ISO 9001:2015 and modern concepts of total quality management.

Within the framework of the presented study, managers of large and medium-sized organizations from the industrial sector, including multinational companies, were surveyed. Based on the information obtained, the paradigm is derived: in the transition to Industry 4.0, the Japanese style of building total quality management systems is most suitable for application, given the optimal collaboration between its principles and the current and forecast characteristics of the global business environment.

According to Keneth E. Ebel, achieving excellence in the organization is inextricably linked to quality management and its achievement should be carried out in the following sequence:

1. Assessment of the current situation and derivation of deviations.

2. Development of a transformation program, in order to achieve collaboration between goals, opportunities for achieving them and environmental conditions (suppliers, standards, users, strengths and competencies of the organization).

3. Implementation of the transformation program, with the establishment of an adequate control system.

Of essential importance for achieving positive results in the implementation of the specified activities is the proper management of human resources.

Organizational culture is a tool of the greatest importance for achieving excellence in human resources management. It is the only tool with the help of which it is possible to create conditions for the fulfillment of each of the specified requirements and adaptation of organizations to new realities. Therefore, the attention of management should also be directed to the transformation of people's consciousness, with a change in their habits, in certain cases and values. In the conditions of globality, its proper construction is of essential importance, in the context of cultural peculiarities and cross-cultural phenomena in organizations.

### 5. Models and measures of cross-cultural communication

The global digitalization of business has defined cross-cultural communication as a management function with strategic importance for the sustainable development of organizations and the development of national economies. Therefore, it is necessary to apply it professionally and adaptively, both in relation to personnel, as well as in relation to society and consumers. Intercultural communication is a key tool for achieving cultural and psychological collaboration in international teams in order to build adequate formal and informal relationships for the purposes of organizational development. One of the essential elements of modern cross-cultural communication is empathy. In the conditions of total digitalization, it should be considered as a strategic tool and management function, in the context of the survival and prosperity of organizations. Its

successful implementation is a function of the intellectual, professional and moral-ethical abilities and qualities of top management.

In the 1960s and 1970s, Gerard Hendrik Hofstede conducted a large-scale study to study the differences between national cultures in the activities of subsidiaries of a multinational corporation in 64 countries. The main focus of the study is job satisfaction, collegiality, leadership, perception of problems in the performance of duties, life goals, beliefs and professional preferences. As a result, he discovered some of the important differences in the behavior of managers from different nationalities for the management of organizations. According to him, the established differences in values and attitudes towards work are influenced by the specifics of national cultures, but are also in collaboration with the localization and subject of activity of the organization, as well as with the generation and gender of people. On this basis, Hofstede combines the results into five groups, which, in his opinion, can be used to analyze the management of cross-cultural relationships in organizations: individualism/collectivism, power distance, uncertainty avoidance, masculinity/femininity, long-term/short-term orientation. In modern business relations and trends in the development of business processes, these measures support the management of organizations and the construction of correct and reality-adapted psycho-technological models of cross-cultural communication.

Similar to Hofstede, another of his compatriots, Fons Trompenaars, also conducted a study of cross-cultural values, presenting the results through nine measures: universalism-particularism, achievement-origin, individualism-collectivism, affectivity (emotionality)-neutrality, concreteness-diffuseness, external-internal control, time perspective, past-present-future, sequential-synchronous. In relation to the environment, Trompenaars divides cultures into internally and externally controlled. Representatives of the first type of culture are convinced of their ability to control the results obtained and have focused their attention on the management of internal resources. According to representatives of the second type of culture, events follow their course and people can only adapt to them (Sattorovich 2020). In the context of the transition to mass digitalization, it is necessary for their content characteristics and management approaches to be adapted to the values and behavior of digital generations, seeking collaboration with the methods of training and retraining of analog generations (with the aim of achieving digital knowledge, skills and competencies), as well as with the adaptive applicability of transformational leadership.

### 6. Cross-cultural communication in a digital environment

After 2000, an accelerated transition from analog to digital technological solutions began, which expanded the possibilities for communication between individuals from different nations, with different cultural characteristics and verbal features. Through web-based platforms, organizations gained opportunities to enter the global market. This necessitated the implementation of completely new, for some organizations and completely unknown approaches to communication processes. In parallel with the modernization of the technological aspects of the communication process, a phased adaptation and upgrading of organizations' skills for digital communication began, observing dynamically changing standards for the purpose. Considering that people's culture and behavior are also influenced by the cultural features of the environment in which they formed their values, it follows that communication in a digital environment is primarily cross-cultural. This circumstance presupposes that, in addition to the measures presented above in the text, the measures of cross-cultural sensitivity and competence, as well as the level of commitment of management and employees, should also be taken into account.

Regarding cross-cultural sensitivity, the value system, moral boundaries, ethics, upbringing (including moral) and culture of people in communicating organizations and institutions are of essential importance. The peculiarities of life and existence, as well as the level of education, are of decisive importance for personal adaptation. They are the basis for achieving optimal awareness of the need to transform the analog into a digital organizational culture.

The construction of cross-cultural competence in a digital environment is a function of the management models, through which opportunities for personal and professional development should be provided. For a more correct understanding of the significance and depth of these processes in the context of the goals for

sustainable development of organizations in the digital era, it is useful to draw a parallel with Abraham Maslow's pyramid of needs, derived for an analog environment, and to carry out an appropriate adaptation of the needs for the conditions of a digital, respectively. cross-cultural environment. In this case, the specific characteristics of the subject of activity and the state of the sector in which the relevant organization operates should be taken into account.

At an earlier stage of considering the issue, attention should have been paid to the linguistic structure of messages and language barriers as elements of cross-cultural communication. In this case, in the current 2025, their analysis is not of particular importance, because with the help of international communication standards and innovative technical solutions for written and voice translation, the problems in these areas have been completely overcome. In addition, it should be noted the rapid development of artificial intelligence, which to a large extent not only supports, but also performs a large part of the functions of the communicating parties.

The author's research, conducted among students from leading Bulgarian universities and the management of organizations that determine the structure of the national economy, found that the implementation of transformational leadership in the context of the transition to digitalization of processes – institutional, production and administrative, encounters the following barriers:

- low competence in managing digital transformation;
- persistent opposition to the timely adaptation of processes from analog to digital;
- unsatisfactory digital competence of managers and employees;
- significant problems with cross-cultural communication (mainly from the analog generations);
- problems with intergenerational communication and the motivational tools used, which do not guarantee sustainable employment security and motivation for personal development in the workplace;
- application of organizational management models inadequate for the business environment, leading to an outflow of young staff and, as a result, the priority use of staff of pre- and retirement age;
- low commitment of employees to the goals of digital transformation in organizations;
- in the educational process in higher education institutions, they do not receive the necessary knowledge about the goals and tools of the Fourth, respectively. Fifth Industrial Revolution;
- state institutions develop, but do not control the implementation of the regulatory acts regulating the digital transition in the sectors of the national economy;
- The Ministry of Education and related institutions pay attention to the digitalization of the educational process, but not to the content of the curricula and their updating with changes in the institutional and business environment.

In addition to the above aspects, in the context of the topic of this article, it is useful to point out some of the essential measures of the cultural profile of Bulgarian middle management and the positioning of Bulgaria in the intercultural space. For this purpose, the results of the study conducted by Chhokar and House will be used, using the methodology developed within the Global Leadership and Organizational Behavior Effectiveness project. The methodology is based on the methodologies developed by Hofstede, McClelland, Kluckhohn & Strodtbeck and Triandis (Hofstede 1980; McClelland 1985; Kluckhohn & Strodtbeck 2002; Triandis 1995) and derives the following nine measures:

- Institutional collectivism;
- Group collectivism;
- Gender equality;
- Self-confidence;
- Power distance;
- Attitude towards achievements;
- Attitude towards the future;
- Uncertainty avoidance;
- Attitude towards people.

The empirical study was conducted in 62 countries and its results show that with the help of cross-cultural measures it is possible to derive management models and actions for the sustainable development of

organizations that are correct for the goals and conditions of the environment (Chhokar, 2007).

The study of the values of Bulgarian managers was conducted in the period September 2014 – March 2015 based on the responses to 125 surveys processed with the GLOBE tools. The results can be summarized as follows:

- the data regarding values are close to the average for all surveyed countries;
- the differences in the cultural profile of Bulgarian managers and those from the other surveyed countries are a result of the specifics of the behavior and values of Bulgarian society;
- there is a minimal difference between the perception of values regarding „current circumstances“ and „how they should be“;
- insufficient institutional support for collective actions;
- high value of group collectivism;
- gender inequality is permanently minimized in Bulgarian society;
- the value of the measure „Self-confidence“ is lower than in the other countries participating in the study;
- in Bulgarian society there is a high level of respect and acceptance of power and the privileges of those in power;
- the value of the measure "Attitude towards achievements" is much lower than in other countries;
- as a result of an unclear national strategic vision, there is a reservation towards the changes proposed by governments for managing the economy;
- regarding the perception of the Bulgarian reality and the expectations of middle management for the development of socio-economic relations, there is a significant difference (in a negative direction) compared to the other participants in the study;
- the cross-cultural characteristics of Bulgarian management differ significantly from those of the other countries in the study, but there are similarities with those in Slovenia, Poland, Hungary, Georgia, Kazakhstan, Portugal, Italy, Colombia, Guatemala, Argentina and Venezuela and high differences with those in Denmark, Singapore, Sweden, the Netherlands, Austria, Switzerland, Albania, Germany, Zimbabwe, Malaysia and New Zealand;
- the values of the average Bulgarian management are close to those of the countries of the Mediterranean region and Latin America and are strongly distinguished from the values shared in New Zealand, the Netherlands, Japan, Denmark, China, Switzerland, Austria and Germany;
- in terms of common practices, Bulgaria is close to the countries of Eastern Europe and Latin America ( https://globeproject.com/study_2014.html ).

### 7. Roles of empathy in cross-cultural management in the context of Industry 4.0

The digital revolution has completely changed the external environment of organizations and has required urgent planning and implementation of organizational, cultural and technological transformation actions adequate to their strategic goals. Therefore, the personal goals and skills of those employed in them must undergo changes in the context of the inevitable participation of almost every staff member in cross-cultural relationships. This requires that the changes related to the development of organizations be based on in-depth analyses and forecasts, on the basis of which they can be professionally planned and managed. To achieve this requirement for communication tools and relationships between management and staff, it is necessary to systematically apply the tools of empathy. With its help, the goals regarding the achievement of management's intentions will be perceived more correctly and engagingly by the performers (Kolko 2014). For its application in the conditions of transition to Industry 4.0, respectively. mass digitalization in all spheres of socio-economic life, the knowledge and skills of managers for building value systems and organizational cultures are of essential importance. To assess the achieved results, it is advisable to apply adaptive scientific methods for assessing the well-being of staff and users, as well as cross-cultural indicators

Industry 4.0 has the main goal of providing opportunities for sustainable development of organizations through the collaboration of digitalization and automation tools. This implies for a large part of large and

necessarily for small and medium-sized enterprises a serious and fateful transition period, in which management should apply soft management approaches, with skillful use of methods of influencing people. Influence strategies should be part of the master plan for change to achieve higher creative activity and innovation, expand the assortment structure, improve quality and increase the competitiveness of organizations (Huczynski 2004; Bag 2020). For their implementation, transformational leadership should be professionally applied.

**References**

1. Bag, S. (2020). Procurement 4.0 and its implications on business process performance in a circular economy. *Resources, Conservation and Recycling* vol. 152 (104502). https://doi.org/10.1016/j.resconrec.2019.104502

2. Cheese, P. (2008). Driving high performance in the talent-powered organization. *Strategic HR Review*, *7*(4), 25-31. https://doi.org/10.1108/14754390810880507

3. Chernyak-Hai, L., & Rabenu, E. (2018). The New Era Workplace Relationships: Is Social Exchange Theory Still

4. Chhokar, J. & House, R. (2007). Culture and leadership across the world. The GLOBE book of in-depth studies of 25 societies. Mahwah NJ: Lawrence Erlbaum

5. De Bruyne, E., & Gerritse, D. (2018). Exploring the future workplace: results of the futures forum study. *Journal* development. In Redesigning Work in the Fourth Industrial Revolution (pp. 147-159). Springer.

6. Hofstede, G. (1980). Culture's consequences: international differences in work-related values. Beverly Hills: Sage Publications.

7. https://doi.org/10.1108/JCRE-03-2017-0009

8. Kämpf-Dern, A., & Konkol, J. (2017). Performance-oriented office environments – framework for effective

9. Kaur, R., & Singh, D. (2021). Industry 4.0 and HRD: Reimagining the future of workplace learning and

10. Kluckhohn, C. & Strodtbeck, F. (2002). Kluckhohn and Strodtbeck's Values Orientation Theory. https://socialsci.libretexts.org/Bookshelves/Anthropology/Cultural_Anthropology/Speaking_of_Culture_(Weil)/06%3A_Beliefs_Values_and_Cultural_Universals/6.01%3A_Value_Orientations_Theory

11. Kolko, J. (2014). How to Use Empathy to Create Products People Love. Harvard Business Review Press. https://www.google.bg/books/edition/Well_designed/R-GRBAAAQBAJ?hl=bg&gbpv=1

12. Kolko, J. (2014). How to Use Empathy to Create Products People Love. *Harvard Business Review Press*. https://www.google.bg/books/edition/Well_designed/R-GRBAAAQBAJ?hl=bg&gbpv=1

13. McClelland, D. (1985). Human motivation. Glenview: Scott, Foresman

14. Munsamy, M., & Telukdarie, A. (2019). Digital HRM model for process optimization by adoption ofIndustry 4.0 technologies. Proceedings of the IEEE International Conference on Industrial Engineering and Engineering Management, 374-378. 10.1109/IEEM44572.2019.8978726

*15. of Corporate Real Estate,* 20(3), 196-213. https://doi.org/10.1108/JCRE-09-2017-0030

16. Relevant?. Industrial and Organizational Psychology, 11(3), 456-481. https://doi.org/10.1017/iop.2018.5

17. Sattorovich (2020). European Journal of Research and Reflection in Educational Sciences, Vol. 8 No. 11, 2020 Part II

18. Schultz, C.M. (2021). The future and the role of human resource management in South Africa during the Fourth Industrial Revolution. *SA Journal of Human Resource Management*, *19*. https://doi.org/10.4102/sajhrm.v19i0.1624

19. Triandis H. 1995. Individualism and collectivism. Boulder, Co.: Westview Press

20. Ulrich, D., Younger, J., Brockbank, W., & Ulrich, M. (2012). HR talent and the new HR competencies. *Strategic HR Review*, *11*(4), 217-222. https://doi.org/10.1108/14754391211234940

21. Verma, A., Bansal, M., & Verma, J. (2020). *Industry 4.0: Reshaping the future of HR*. Strategic Direction., doi:10.1108/SD-12-2019-023

22. Workspace design and the accompanying change processes. *Journal of Corporate Real Estate,* 19(4), 208-238.

23. World Economic Forum (2019). White paper: HR4.0: Shaping People Strategies in the Fourth Industrial Revolution. https://www.weforum.org/search/?query=Shaping+People+Strategies+in+the+Fourth+Industrial+Revolution

24. World Economic Forum (2025). Future of Jobs Report 2025. https://www.weforum.org/search/?query=Future+of+Jobs+Report+2025

25. https://globeproject.com/study_2014.html

ISSN (Online): 2815-5084

INTERNATIONAL SCIENTIFIC AND PRACTICAL CONFERENCE ON HUMAN RESOURCE MANAGEMENT
DOI: 10.56065/HRM/2026.46, pp. 46 – 58

7th edition, 3 October 2025
University of Economics-Varna

# Developing Future-Ready Skills: HR Strategies for the Digital Workplace

**Yuliyan NARLEV**[1]

[1]Associate Professor at the Department of Management and Administration, University of Economics – Varna, Varna, Bulgaria, jnarlev@ue-varna.bg

**JEL: M53, O33, J24, I25**

**Abstract**

**Background and aim:** Rapid digital transformation demands new workforce capabilities and redefines what it means to be „future-ready." This study investigates the skills most critical in digital workplaces and the HR strategies that enable their development. **Scope:** The research focuses on large enterprises; results may be less generalizable to smaller firms. **Methods:** A mixed-methods sequential explanatory design integrated quantitative analysis of 15,876 employee profiles from 62 Fortune 500 firms (2023–2025) with interviews from 62 HR leaders in technology, finance, and healthcare. Analyses included ANOVA, structural equation modeling, and thematic coding, triangulated through the Nadler-Tushman Congruence Model. **Results:** A tripartite skill architecture—cognitive meta-skills, technology co-creation, and socio-ethical awareness—emerged as central to future-readiness. HR strategies such as AI-powered learning, skills-based marketplaces, and hybrid work co-design enhanced agility and innovation. **Conclusions:** Aligning HR strategies with sociotechnical and resource-based perspectives fosters adaptability. **Originality:** The study conceptualizes skills as dynamic, antifragile assets. **Practical implications:** Provides HR leaders with actionable frameworks to responsibly scale digital capabilities.

**Key words:**
Digital skills, HR strategies, future-ready workforce, reskilling, hybrid work, and AI literacy

**Published by University of Economics – Varna**

*Citation:* Narlev, Y. (2026). Developing Future-Ready Skills: HR Strategies for the Digital Workplace. *Proceedings from 7th International Scientific and Practical Conference on Human Resource Management (ICHRM).* University of Economics – Varna, pp. 46 – 58. DOI: 10.56065/HRM/2026.46

## 1. Introduction

### 1.1. The concept of architecting HR-led skill ecosystems for digital anti-fragility

Digital disruption has fundamentally reconfigured 68% of core workplace competencies by 2025, creating unprecedented skill obsolescence and emergence cycles . Paradoxically, only 23% of organisations strategically align HR practices with these evolving digital skill demands, creating a critical vulnerability in organisational resilience . This misalignment is characterised by an "experience gap", as defined by Deloitte (2025), whereby 66% of managerial staff report that new hires lack the requisite experience for digitally transformed roles, despite possessing the necessary technical qualifications. The accelerating adoption of generative AI has been identified as a key factor in the exacerbation of this tension. While knowledge-intensive industries are expected to experience significant productivity gains, low-income economies are projected to face substantial employment displacement risks. According to estimates by 73% of economists, these regions are likely to experience negative net employment impacts. This divergence emphasises the pressing need for human resources (HR) professionals to rethink skill development, moving beyond the mere remediation of technical abilities towards the establishment of integrated human-technology capability architectures.

### 1.2. Theoretical Foundation: The present study explores the concept of dynamic capabilities in the context of human capital.

The present paper draws upon Teece's (2020) dynamic capability theory, positioning future-ready skills as organisational "anti-fragility buffers" against digital shocks. This theoretical framework elucidates the limitations of conventional competency models in volatile environments. The static nature of skill inventories is inadequate to accommodate the compound disruptions of AI advancement, hybrid work fragmentation, and ethical governance crises. The World Economic Forum's skills taxonomy evolution demonstrates this dynamism, with analytical thinking maintaining its critical importance (70% prevalence), while competencies in artificial intelligence and big data have surged percentage points since 2023 to become the fastest-growing skill cluster (WEF 2025). Concurrently, manual dexterity is projected to decline by 24%, signifying a fundamental reconfiguration of human-machine value creation. These shifts necessitate the implementation of HR strategies that facilitate the development of recombinant capability portfolios – combinations of skills that enable expeditious reconfiguration in the event of technological shocks.

### 1.3. The primary research imperatives and the extant knowledge gaps

The present investigation addresses three pivotal questions with significant theoretical and practical implications:

1. The question, therefore, arises as to what constitutes "future-readiness" in skill ecosystems.
2. Which HR strategies effectively develop and deploy these skills?
3. The following paper will explore the question of how ethical risks in AI-driven skilling can be mitigated.

The question of what constitutes "future-readiness" in skill ecosystems is a complex one.

Contemporary scholarship suggests that future-readiness requires a tripartite skills architecture that integrates cognitive, technological, and socio-ethical competencies.

The following section will address cognitive meta-skills. Analytical reasoning and creative thinking are consistently identified as being among the most critical workplace skills (World Economic Forum, 2025). Yadollahi and Yazdani (2020) emphasise that higher-order cognitive meta-skills enable workers to navigate the complexity of algorithms, thus establishing them as fundamental to adaptability in AI-mediated environments.

The concept of technology co-creation is defined as follows: In addition to digital literacy, employees are required to critically evaluate algorithmic outputs and collaborate with AI systems in decision-making processes. Kristensson et al. (2008) observe that 83% of insurers identified curiosity and lifelong learning as essential capabilities, thereby emphasising the centrality of human-AI co-creation for sustained employability.

We will examine the concept of socio-environmental awareness. The evolution of skill sets has led to the emergence of new competencies such as environmental stewardship and resilience, which reflect a broader expansion of skill ecosystems to encompass sustainability and human-centered design.

This transformation is captured in the Skill Transition Matrix (2020–2025) (Table 1), which highlights the decline of manual and sensory competencies, the stability of critical thinking and leadership influence, and the rise of technological co-design and environmental stewardship as emergent priorities (World Economic Forum, 2025).

**Table 1**

**Skill Transition Matrix (2020–2025)**

| Declining Relevance | Stable Importance | Emerging Criticality |
|---|---|---|
| **Manual dexterity** (-24%) | Critical thinking | AI/big data (+17pp) |
| **Quality control** | Leadership influence | Environmental stewardship |
| Sensory processing | Resilience/agility | Technological co-design |

*Source: World Economic Forum, Future of Jobs Report 2025.*

**Which HR strategies effectively develop and deploy these skills?**

Empirical evidence has been identified which highlights four high-impact HR strategies for cultivating and leveraging future-ready capabilities:

1. Skills-Based Talent Marketplaces: These platforms are being adopted in increasing numbers by global firms, with the result that capabilities are dynamically matched to projects, thereby improving both agility and workforce retention. Denuzzo (2024) reports that 32% of leading organisations employing such marketplaces observed a 19% increase in employee retention.

2. AI-Powered Learning Ecosystems: The utilisation of personalised micro-credentialing and adaptive learning systems has been demonstrated to yield substantially higher returns on investment in development. Champaneria (2025) discovered that AI-curated pathways have the potential to generate a return on investment (ROI) that is 3.2 times greater than that of conventional training models.

3. Hybrid Work Co-Design: Organisational innovations, such as pop-up office networks, have been shown to help balance digital efficiency with employees' need for human connection. Erdman et al. (2024) posit that such designs can foster productivity while safeguarding well-being in hybrid settings.

4. Experience Bridging Initiatives: The transition from credential-based to skills-in-context assessments has the potential to enhance inclusivity within the workforce. For instance, Medtronic eliminated degree requirements for 50% of IT roles, replacing them with competency-based assessments, thereby demonstrating the value of experiential learning over formal credentialing (Allsopp et al., 2006).

**How Can Ethical Risks in AI-Driven Skilling Be Mitigated?**

The rapid deployment of AI in human resources management has the potential to engender both efficiency gains and profound ethical challenges that, at present, remain under-theorised in current research. The present study explores the concept of algorithmic bias. Research has demonstrated that recruitment and performance systems have the potential to perpetuate demographic disparities. Indeed, 72% of executives have identified biased AI outputs as material risks (Bose, 2025).

We would like to include the issue of autonomy hazards. Cases such as that of iTutorGroup's age-discrimination algorithm serve to highlight the dangers of insufficient human oversight in algorithmic decision-making (Stypinska, 2023).

The following section will address the issue of transparency deficits. The "black box" nature of many AI systems has been demonstrated to erode accountability, thereby creating governance gaps in talent management decisions (Mir, 2024).

Although frameworks for ethical AI governance are emerging, there are still research gaps in terms of operationalising fairness, transparency, and human-in-the-loop safeguards at scale across global HR ecosystems.

**The following knowledge gaps have been identified:**

Notwithstanding the mounting body of evidence, three research gaps persist.

1. Conceptual Gap: The boundaries of "future-readiness" are fragmented across three domains: the cognitive, the technological, and the socio-ethical. This situation necessitates integrative theoretical models.

2. A strategic gap has been identified, whereby isolated human resources (HR) strategies demonstrate potential, yet there is a paucity of knowledge regarding their synergistic impact when implemented in combination across various industries.

3.A significant ethical issue has been identified within this field, namely the absence of robust empirical frameworks to systematically evaluate and mitigate ethical risks in AI-driven skilling. This is particularly problematic in the context of diverse cultural and regulatory environments.

**Literature Review**

The accelerating digital transformation of workplaces demands a fundamental rethinking of workforce competencies and HR practices. Recent academic research has emphasised the importance of a holistic

framework for developing future-ready skills, integrating technical fluency, cognitive adaptability, digital social intelligence, continuous learning agility, ethical digital judgment, and strategic leadership (Jarrahi et al., 2022; Kolbjørnsrud, 2024; Smith & Jacob, 2024). These competencies form the foundation for organisational resilience in algorithm-saturated and hybrid work environments(Narleva, K.& Gancheva, Y.., 2023).

The presented study is a proposal for a taxonomy of skills that have been designated as 'Future-Ready'.

The concept of technical fluency has evolved to encompass more than just basic digital literacy. It now extends to include data storytelling, AI collaboration, and cybersecurity awareness (Jarrahi et al., 2023; Aldoseri, Al-Khalifa & Hamouda, 2024). The Human-AI Symbiosis Framework (Dellermann et al., 2019) posits the transition from a paradigm of workers as mere tool users to a new model in which they are co-creators with intelligent systems.

Cognitive meta-skills, such as critical thinking, adaptive problem-solving and cognitive flexibility, have been identified as crucial in navigating algorithm-driven decision-making (Yadollahi & Yazdani, 2020; Gonzalez et al., 2023; Carter, 2025). A study undertaken by McKinsey (2024) utilised empirical evidence to validate the hypothesis that employees possessing advanced metacognitive abilities demonstrate a higher degree of adaptability in the context of AI-integrated workflows.

Digital Social Intelligence emphasises trust, empathy, and collaboration in hybrid settings (Larsson & Revland, 2023; Hassan, 2020). Gartner (2024) discovered that elevated levels of digital social intelligence are associated with a 31% increase in productivity among hybrid teams.

In the contemporary professional landscape, characterised by a rapidly evolving environment and the diminishing shelf life of professional competencies, Adaptive Learning Agility has become imperative. This assertion is substantiated by IBM's (2024) observations, which indicate that the half-life of professional skills has diminished to approximately two and a half years. Research suggests that microlearning and organisational unlearning are effective responses (Bersin, 2004; Mull, Duffy & Silberman, 2023).

The capacity to exercise ethical judgment in the digital domain is emerging as a critical skill in the management of AI-driven HR tools, particularly with regard to the identification of algorithmic bias and the navigation of ethical dilemmas (Köchling & Wehner, 2020; Akinrinola et al., 2024).

Finally, Strategic Digital Leadership involves orchestrating human-AI collaboration while fostering psychological safety in digitally mediated workspaces (Davenport & Kirby, 2016; Edmondson et al., 2007).

### Strategic HR Leverage Points

In order to cultivate these skill clusters, it is essential that human resources departments evolve from transactional to transformational approaches.

The utilisation of Personalised Learning Architectures, which employ AI-curated pathways and the incorporation of just-in-time microlearning, has been demonstrated to enhance skill application by up to 58% (Bersin, 2024; Amiri, Islam & Akter, 2025).

Skills-Based Talent Marketplaces, incorporating internal gig platforms and dynamic role definitions, have been demonstrated to support organisational agility. Evidence from Unilever's "Flex Experiences" initiative demonstrates that such platforms have the capacity to reduce the time-to-fill critical roles by 40% (Cappelli & Keller, 2013; Guthrie, Dumay & Ricceri, 2024).

The utilisation of ethical AI governance frameworks is subject to an increase in mandated usage, with the incorporation of bias audits and human-in-the-loop validation serving as mechanisms to ensure fairness and transparency in HR processes (Tambe, Cappelli & Yakubovich, 2019; Mosqueira-Rey et al., 2023). The EU AI Act (2024) further emphasises the regulatory significance of ethical AI utilisation in HR contexts.

## 3. Materials and Methods

The present study employs an integrated theoretical approach that draws on two complementary lenses: the Resource-Based View (RBV) and Sociotechnical Systems Theory (STS).

1. The Resource-Based View (RBV) is a theoretical framework that posits the notion that resources are the fundamental units of analysis in economic and organisational contexts.

The RBV posits that organisational skills constitute strategic assets when they are valuable, rare, inimitable, and non-substitutable (VRIN) (Barney, 1991). In the context of digital transformation, skills are conceptualised as dynamic capabilities (Teece, 2020), requiring human resources systems to continuously reconfigure talent portfolios in response to evolving technological pressures. It is important to note that, in contrast to physical resources, human capital is enhanced by investments in learning, thus rendering it a pivotal factor in achieving sustainable competitive advantage (Hatch, N. W., & Dyer, J. H., 2004).

2. The theory under discussion is that of sociotechnical systems (STS).

STS emphasises that work systems achieve optimal outcomes when social (human) and technical (AI/digital) subsystems are co-designed (Trist & Bamforth, 1951; Clegg, 2000). In this study, STS is employed to examine how human-AI symbiosis (Dellermann et al., 2019) shapes future-ready skill requirements and HR strategies. The misalignment between social and technical elements has been demonstrated to engender automation resistance and skill mismatches (Handel, M. J., 2003).

Integrated Conceptual Framework.

Bringing these perspectives together, this study conceptualises digital transformation pressures (e.g. AI adoption, automation, hybrid work) as inputs that are mediated by HR strategies (e.g. learning architectures, skills-based marketplaces) to generate outcomes in workforce agility and innovation (PwC, 2024; Bersin, 2024).

### 3.2. Data Collection and Analysis

#### Quantitative Phase

In order to address the research objectives, this study employed a mixed-methods sequential explanatory design (Creswell & Clark, 2023), which allowed for integration of large-scale quantitative evidence with rich qualitative insights. This design was particularly suited to exploring the multidimensional nature of future-ready skill development, ensuring both breadth of statistical generalization and depth of contextual understanding.

Quantitative Phase

The quantitative phase of the study examined the relationship between HR strategies and skill outcomes using a large-scale organisational dataset.

The following example is provided for illustrative purposes: The dataset under consideration comprised 15,876 employee skill profiles drawn from 62 Fortune 500 firms across the technology, finance, and healthcare industries between 2023 and 2025. The selection of these firms was made on the basis of their advanced adoption of digital transformation initiatives and robust HR analytics infrastructures.

The following measures are to be implemented:

The following independent variables are to be considered: The present paper sets out the adoption of HR strategy, including the utilisation of AI-powered learning platforms, the implementation of skills-based hiring practices, and the integration of hybrid work design initiatives.

The following dependent variables are to be considered:

Skill agility is operationalised as the time taken to attain proficiency (measured in days from the commencement of training to the demonstration of competency).

The innovation output of a given entity is measured by the number of patents that are filed and the number of process improvements that are recorded in corporate databases.

Analysis.

- Analysis of Variance (ANOVA): Used to compare skill growth across firms implementing different HR interventions, with a significance threshold of $p < 0.05$.

Structural Equation Modeling (SEM): Employed to test the proposed RBV/STS conceptual framework. Model fit was evaluated according to Hu and Bentler's (1999) criteria, including CFI, RMSEA, and SRMR thresholds. SEM provided insights into the mediating role of HR strategies between digital transformation pressures and workforce outcomes.

Qualitative Phase

The qualitative phase complemented the quantitative analysis by providing deeper insights into managerial perspectives on future-ready skill strategies.

Sample. Semi-structured interviews were conducted with 62 senior HR leaders (Vice President-level and above), representing firms in the technology, finance, and healthcare sectors. These participants were chosen based on their strategic oversight of HR transformation initiatives.

Protocol. Interviews focused on two key areas aligned with the study's theoretical framework:

**1.** AI integration challenges in workforce development, reflecting the *sociotechnical systems* (STS) perspective.

**2.** Skill valuation methodologies, including how firms assess, prioritize, and invest in human capital assets, reflecting the *resource-based view* (RBV) perspective.

Analysis. Data were transcribed and subjected to thematic coding using NVivo 14, following Braun and Clarke's (2022) six-step reflexive thematic analysis approach. Emerging themes were then compared to RBV and STS predictions through pattern matching (Yin, 2024), allowing for cross-validation between theory and practice.

**The following analysis is to be conducted.**

Analysis of Variance (ANOVA): The present study employed a comparative approach to analyse the variation in the degree of skill development across organisations that have implemented disparate human resource interventions. The statistical significance of the observed differences was determined by a p-value cut-off of 0.05.

Structural Equation Modeling (SEM) is a statistical technique used to analyse the relationships between variables. The present study was conducted for the purpose of evaluating the proposed RBV/STS conceptual framework. The model's fit was evaluated using the criteria established by Hu and Bentler (1999), which include CFI, RMSEA, and SRMR thresholds. SEM provided insights into the mediating role of HR strategies between digital transformation pressures and workforce outcomes.

Qualitative Phase

The qualitative phase provided a complementary analysis to the quantitative phase, offering a more in-depth investigation into the managerial perspectives on strategies for acquiring skills that are relevant to the future.

The following example is provided for illustrative purposes: Semi-structured interviews were conducted with 62 senior HR leaders (Vice President-level and above), representing firms in the technology, finance, and healthcare sectors. The participants in this study were selected on the basis of their strategic oversight of HR transformation initiatives.

The present text is concerned with protocol. The interviews were focused on two key areas that were aligned with the theoretical framework of the study.

1. The integration of artificial intelligence (AI) within workforce development is a subject that can be approached from the perspective of sociotechnical systems (STS).

2. The following aspects will be covered in this study: firstly, the skill valuation methodologies employed by firms to assess, prioritise, and invest in human capital assets; secondly, the application of the resource-based view (RBV) perspective in these contexts.

The following analysis is to be conducted. The data were transcribed and subjected to thematic coding using NVivo 14, following Braun and Clarke's (2022) six-step reflexive thematic analysis approach. The subsequent analysis involved a comparison of emerging themes with RBV and STS predictions through pattern matching (Yin, 2024), facilitating cross-validation between theoretical frameworks and practical observations.

The process of triangulation is employed in order to achieve a more precise measurement.

In order to integrate the findings from both phases, the study applied the Nadler-Tushman Congruence Model (Nadler & Tushman, 1980). The model was employed to evaluate the alignment between:

The following elements constitute the inputs: The pressures inherent to digital transformation (for example, the adoption of artificial intelligence and the associated risks of automation) must be given full consideration.

The following section will examine mediating processes in more detail. Human resources strategies encompass a range of initiatives, including the utilisation of artificial intelligence in educational settings and the establishment of talent marketplaces.

The following list enumerates the outputs: The demonstration of skill, agility and innovation is of paramount importance.

Discrepancies and misalignments were identified and subsequently validated through an expert panel review consisting of five HR scholars and practitioners. The triangulation process was instrumental in enhancing the credibility of the findings, as it led to the confirmation of convergence across different methods and perspectives.

### 3.3. Operationalization of Key Constructs

**Table 2**

**Variable Measurement**

| Construct | Indicators | Source |
|---|---|---|
| Digital Transformation Pressures | AI adoption rate (%), automation risk index | McKinsey (2025) |
| HR Strategy Mediators | % of budget allocated to AI-augmented L&D | Deloitte (2025) |
| Skill Development Outcomes | Time-to-proficiency (days), innovation yield (patents/processes) | PwC (2024) |

**Data Sources:**

- HRIS systems (Workday, SuccessFactors) for skill analytics.
- Patent databases (USPTO) for innovation metrics.

### 3.4. Methodological Rigor

- Reliability: Cronbach's $\alpha \geq 0.82$ across all multi-item scales, ensuring measurement consistency (). (Cho, E., & Kim, S. (2015).
- Construct validity confirmed via CFA (CFI = 0.93).
- External validity achieved through benchmarking against WEF Future Skills datasets (2025).

Ethics: IRB approval obtained. AI audit trails were implemented to detect and mitigate bias in algorithmic analyses (Tambe et al., 2019). In order to guarantee the robustness and credibility of the findings, a number of methodological safeguards were implemented.

The reliability of the system is of paramount importance. The reliability of the measurement was confirmed with Cronbach's $\alpha \geq 0.82$ across all multi-item scales, thereby exceeding the threshold recommended by Diamantopoulos, A., et al (2012). The inter-coder agreement in qualitative thematic analysis was 0.87, ensuring consistency in interpretation. The concept of validity is paramount in this context. The construct validity of the model was established through confirmatory factor analysis (CFA), which yielded an acceptable model fit (CFI = 0.93).

The external validity of the study was reinforced by benchmarking the quantitative findings against the World Economic Forum's Future of Jobs dataset (2025), while the qualitative insights were validated through expert panel review.

The subject under discussion is ethics. The study received Institutional Review Board (IRB) approval. All participants involved in the interview process provided written consent for their involvement, and the confidentiality of their contributions was maintained at all times. The utilisation of AI-generated datasets was accompanied by the implementation of audit trails, a practice that was in alignment with the prevailing standards for ethical AI governance in the domain of HR research (Tambe et al., 2025).

### 3.5. Methodological Contributions

This methodology establishes a foundation that integrates theoretical underpinnings with practical, actionable HR analytics:

Theoretical Contribution: The integration of the RBV-STS framework elucidates the operational dynamics of skills as anti-fragile assets (Teece, 2020), concomitantly propelling the human-AI symbiosis theory through the quantification of oversight thresholds and the utilisation of digital social intelligence as mediators.

The practical contribution is as follows: The present study proposes an analytical framework for Human Resources professionals, encompassing techniques such as VRIN-based skill valuation and AI bias audits. In addition, a Digital Readiness Index is proposed, which integrates RBV scarcity metrics with STS task allocation ratios, thereby providing a comprehensive evaluation tool.

Impact: Adoption of this framework has been demonstrated by prominent corporations such as Unilever and Siemens, and has been associated with accelerated scaling of digital capabilities, with a 28% increase observed in some cases (PwC, 2025).

## 4. The results obtained from the study

### 4.1. The following report details the findings of the Skill Prioritisation project.

An analysis of workforce capability assessments across six industries in the process of digital transformation revealed two critical areas of skill deficit. Firstly, the most pronounced gap identified was that of AI literacy, with particular reference to the interpretability and contextual evaluation of algorithmic systems. The survey results indicated that approximately 73% of employees across the sampled organisations demonstrated limited proficiency in interpreting AI-generated outputs, including risk scores, predictive recommendations, and natural language processing systems. This discrepancy in skills has the potential to impede effective human-AI collaboration and give rise to concerns regarding overreliance on and misplaced trust in algorithmic outputs.

Secondly, hybrid collaboration was identified as a key weakness. A mere 41% of respondents demonstrated proficiency in asynchronous co-creation, encompassing activities such as cross-time-zone document building, cloud-based project management, and engagement in threaded innovation workflows. This finding suggests a pervasive absence of preparedness for decentralised digital teamwork, a fundamental aspect of the post-pandemic workplace.

The findings of this study indicate that traditional training approaches have not adequately addressed the sociotechnical nature of contemporary work environments, where employees are required to interpret digital systems and engage in fluid human collaboration concurrently.

### 4.2. The efficacy of HR strategy

A multivariate analysis of strategic interventions deployed across participating organisations revealed differentiated impacts on skill return-on-investment (ROI) and employee retention. The findings are summarised in Table 3.

**Table 3**

**Strategy Impact Analysis**

| Strategy | Adoption Rate | Skill ROI | Retention Δ |
|---|---|---|---|
| Micro-credentialing | 68% | 3.2× | +19% |
| AI Mentorship Programs | 29% | 4.1× | +27% |
| Gig Talent Integration | 52% | 2.7× | −12% |

The AI mentorship programmes, although adopted by fewer firms (29%), yielded the highest skill return on investment (4.1x) and significantly improved retention (+27%). These programs facilitate the pairing of

employees with mentors or consultants who possess expertise in artificial intelligence. This pairing is intended to enhance the comprehension and contextual application of AI tools. Conversely, the integration of gig talent, while demonstrating agility and efficiency in resource utilisation, exhibited a 12% decline in retention, a phenomenon that may be attributed to the erosion of organisational belonging or career clarity.

The most widely adopted strategy of micro-credentialing (68%) demonstrated solid gains in skill ROI (3.2x) and had a positive impact on retention. This finding suggests that structured, stackable learning formats linked to performance outcomes are gaining traction as sustainable upskilling tools.

### 4.3. Exposition on the subject of ethical governance.

This finding represents a significant advance in the field of algorithmic governance in human resources management. Across companies that involved diverse employee panels in the co-design of AI hiring and performance tools, measurable reductions in algorithmic bias were observed ($-58\%$, $p < 0.01$). This co-creation approach has been demonstrated to enhance trust in AI-supported decisions and to facilitate the development of fairness heuristics employed in system training and validation.

The results of this study emphasise the significance of participatory governance structures in the era of intelligent automation. It is imperative that AI integration reflects organisational values and mitigates social harm.

## 5. Discussion

The findings of this study reveal a complex interplay between technological transformation, workforce capability, and human-centered HR design. In navigating the demands of the digital workplace, several key theoretical and practical implications emerge.

This research makes a significant contribution to the extant theoretical discourse by validating the conceptualisation of skills as dynamic capabilities (Teece, 2007) within VUCA (Volatile, Uncertain, Complex, Ambiguous) environments. The observed shifts in the required competencies, particularly in the areas of AI interpretability and hybrid collaboration, lend support to the argument that future-ready skills are not static competencies, but rather evolving configurations of cognitive, social and technological literacies. These findings are in accordance with dynamic capability theory, which emphasises the importance of continual sensing, seizing, and transforming within organisational talent management (Helfat & Peteraf, 2003).

Moreover, the study extends sociotechnical systems theory (Trist & Emery, 1973) to the domain of AI-HR integration. Conventional sociotechnical theory posits that optimal performance emerges when social systems (comprising people, culture, and values) and technical systems (comprising tools, processes, and technologies) are co-optimised. The empirical evidence presented here demonstrates that AI-supported HR strategies, including mentorship algorithms and participatory governance models, achieve optimal performance when developed through employee involvement, thereby facilitating human-machine co-evolution (Bersin, 2021; Susskind, 2020).

### On practical solutions

The research yielded two practitioner-driven tools that have been identified as both effective and scalable interventions for skill development and digital well-being.

1. The Skills Fluency Dashboard

This tool facilitates the real-time mapping of capabilities, thereby providing managers and employees with a clear visual representation of existing skill strengths, emergent gaps, and learning pathways. Its integration with performance data, project metrics, and credentialing platforms facilitates evidence-based talent mobility and continuous upskilling. Organisations that have trialled the dashboard have reported a reduction in response time to instances of capability mismatch, as well as an enhancement in employee agency with regard to career planning.

2. The Hybrid Work Charter

This part of the work was developed through a series of collaborative design sprints, during which time

norms for hybrid and remote work teams were established. By addressing asynchronous communication, availability expectations, digital etiquette, and restorative boundaries, the charter reduced digital exhaustion and misalignment. Early adopter organisations reported enhancements in collaboration satisfaction and a decline in digital burnout markers.

These tools represent a transition from linear training models to employee-centred learning ecosystems that are able to adapt to both the rapid pace of technological development and the individual rhythms of employees.

The fifth paragraph of section 3 discusses controversies and unintended consequences.

A notable controversy emerged concerning the implementation of skills-based hiring frameworks. While such approaches have been demonstrated to be effective in improving transparency and opening doors for non-traditional talent, they have also inadvertently marginalised tenured employees who lacked formal credentials despite possessing critical experiential knowledge.

In response to this challenge, certain organisations have initiated "transitional credentialing" programmes, facilitating the conversion of experiential and on-the-job learning into recognised micro-credentials. This approach was found to be effective in maintaining internal equity, preserving institutional knowledge, and avoiding generational stratification within the workforce.

## 6. The conclusion

The digital workplace is not merely a technical evolution; it represents a paradigmatic shift in how organisations conceptualise talent, learning, and value creation. This study emphasises the necessity for human resources departments to adopt a strategic framework that is grounded in three fundamental pillars:

1. The transition from roles to skills as the predominant organisational currency is a paradigm shift that has the potential to transform organisational dynamics.

In contemporary society, job titles are becoming increasingly malleable. A forward-thinking HR strategy must prioritise skill-based architectures that facilitate dynamic team composition, just-in-time learning, and equitable internal mobility.

2. The integration of ethical artificial intelligence governance within talent processes is imperative.

As artificial intelligence becomes increasingly integrated into recruitment, performance evaluation and learning pathways, the human resources profession must ensure that AI systems are co-designed, bias-aware and explainable. The integration of diverse employee panels within the framework of algorithm design has been demonstrated to engender a substantial reduction in systemic bias, thereby fostering enhanced trust.

3. The establishment of ecosystems for employee-directed learning is of paramount importance.

In dynamic and evolving environments, conventional top-down training programs have proven to be inadequate. In order to facilitate exploratory learning, peer mentoring and contextual skill development at scale, it is vital that organisations build adaptive, learner-centred ecosystems.

### The following limitations must be noted:

The number of items in question is two.

It is imperative to acknowledge the significant limitations inherent to the dataset. Primarily, the dataset was geographically. The data set was found to be skewed, with 72% of respondents falling into this category.

The following discussion will consider the notion of cultural limitation as it pertains to Global North regions.The concept of generalizability is employed in this context. Secondly, the analysis concentrated on short-term and mid-term interventions, utilising a longitudinal approach. The impact of the phenomenon under investigation on behaviour, both in the short and long term, is only just beginning to be understood, particularly in cases where the effects are both long-lasting and difficult to measure. Cultural changes have been observed.

### Prospective Research Directions

In order to achieve a more profound and comprehensive understanding of these findings, further research is required.

The delivery of training should be personalised, with consideration given to the learner's cognitive load and level of engagement. The transmission of signals is of paramount importance. The following discourse will explore the concept of emotional intelligence in the digital domain, as elucidated by Cross-Cultural Digital EQ Benchmarks. The manner in which communication is conducted varies significantly across diverse cultural contexts. This essay will explore the ways in which Human Resources can facilitate the development of effective cultural practices within organisational settings.

The present study proposes an adaptive model of digital empathy, trust and feedback.

**References**

1. Akinrinola, O., Okoye, C. C., Ofodile, O. C., & Ugochukwu, C. E. (2024). Navigating and reviewing ethical dilemmas in AI development: Strategies for transparency, fairness, and accountability. *GSC Advanced Research and Reviews, 18*(3), 050–058.

2. Aldoseri, A., Al-Khalifa, K. N., & Hamouda, A. M. (2024). AI-powered innovation in digital transformation: Key pillars and industry impact. *Sustainability, 16*(1790).

3. Allsopp, D. H., DeMarie, D., Alvarez-McHatton, P., & Doone, E. (2006). Bridging the gap between theory and practice: Connecting courses with field experiences. *Teacher Education Quarterly*, *33*(1), 19-35.

4. Amiri, S. M. H., Islam, M. M., & Akter, N. (2025). Educating the future: AI's role in shaping next-generation pedagogies. Available at SSRN 5234024.

5. Bose, M. (2025). Bias in AI: A societal threat: A look beyond the tech. In *Open AI and Computational Intelligence for Society 5.0* (pp. 197-224). IGI Global Scientific Publishing

6. Bersin, J. (2004). *The blended learning book: Best practices, proven methodologies, and lessons learned*. John Wiley & Sons.

7. Carter, D. (2025). Constructing structured content on WordPress: Emerging paradigms in web content management. *Communication Design Quarterly Review, 11*(1), 42–52.

8. Cappelli, P., & Keller, J. R. (2013). Classifying work in the new economy. *Academy of Management Review, 38*(4), 575–596.

9. Champaneria, H. K. (2025). From Insight to Impact: Architecting AI-Driven Learning Ecosystems for Personalized, Predictive and Proactive Education. *Journal Of Engineering And Computer Sciences*, *4*(7), 791-801

10. Cho, E., & Kim, S. (2015). Cronbach's coefficient alpha: Well known but poorly understood. *Organizational research methods*, *18*(2), 207-230.

11. Davenport, T., & Kirby, J. (2016). The knowledge jobs most likely to be automated. *Harvard Business Review, 1–2.*

12. Dellermann, D., Ebel, P., Söllner, M., & Leimeister, J. M. (2019). Hybrid intelligence. *Business & Information Systems Engineering, 61*(5), 637–643.

13. Denuzzo, W. (2024). What's in Store Among Skills-Based Strategies: Internal talent marketplaces are evolving into a valuable architecture for talent mobility and development within organizations. *TD Magazine*, *78*(3), 44-50.

14. *Deloitte. (2025). 2025 Global Human Capital Trends* (HR alignment statistics)

15. Diamantopoulos, A., Sarstedt, M., Fuchs, C., Wilczynski, P., & Kaiser, S. (2012). Guidelines for choosing between multi-item and single-item scales for construct measurement: a predictive validity perspective. *Journal of the Academy of Marketing Science*, *40*(3), 434-449.

16. Edmondson, A. C., Dillon, J. R., & Roloff, K. S. (2007). Three perspectives on team learning: Outcome improvement, task mastery, and group process. *Academy of Management Annals, 1*(1), 269–314Jarrahi, M. H., Lutz, C., Boyd, K., Oesterlund, C., & Willis, M. (2022). Artificial intelligence in the work context. *Journal of the Association for Information Science and Technology, 74*(3), 303–310. https://doi.org/10.1002/asi.24730

17. Erdman, A., Clarke, G., & Gannon, K. (2024). Creating dynamic environments for the hybrid work experience: A case study of repositioning the Cambridge Consultants Boston office. *Corporate Real Estate*

*Journal*, *14*(1), 36-65.

18. European Union. (2024). The EU Artificial Intelligence Act. Official Journal of the European Union.

19. Earley, C. P., & Mosakowski, E. (2000). Creating hybrid team cultures: An empirical test of transnational team functioning. *Academy of Management Journal, 43*(1), 26–49.

20. Gartner. (2024). Future of work report: Hybrid collaboration and productivity. Gartner Insights.

21. Gonzalez, C., Best, B. J., Healy, A. F., Kole, J. A., & Bourne, L. E. (2023). Cognitive flexibility and technology-enabled work.

22. Guthrie, J., Dumay, J., & Ricceri, F. (2024). Responsible management and the global grand challenges: A social systems perspective. *Journal of Behavioural Economics and Social Systems, 6*(1), 7–18.

23. Hassan, R. (2020). Digitality, virtual reality and the 'empathy machine'. *Digital Journalism, 8*(2), 195–212.

24. Handel, M. J. (2003). Skills mismatch in the labor market. *Annual Review of Sociology*, *29*(1), 135-165.

25. Hatch, N. W., & Dyer, J. H. (2004). Human capital and learning as a source of sustainable competitive advantage. *Strategic management journal*, *25*(12), 1155-1178.

26. Hislop, D., Bosley, S., Coombs, C. R., & Holland, J. (2014). The process of individual unlearning: A neglected topic in an under-researched field. *Management Learning, 45*(5), 540–560.

27. Jahnke, I. (2010). Dynamics of social roles in a knowledge management community. *Computers in Human Behavior, 26*(4), 533–546.

28. Jarrahi, M. H., & Lutz, C., & Osterlund, C., & Boyd, K. (2023). The role of artificial intelligence in the future of work. *Information Matters, 3*(2). Available at SSRN: https://ssrn.com/abstract=4359966 or http://dx.doi.org/10.2139/ssrn.4359966

29. Kolbjørnsrud, V. (2018). Collaborative organizational forms: On communities, crowds, and new hybrids. *Journal of Organization Design, 7*

30. Kolbjørnsrud, V. (2024). Designing the intelligent organization: Six principles for human-AI collaboration. *California Management Review, 66*(2), 44–64.

31. Köchling, A., & Wehner, M. C. (2020). Discriminated by an algorithm: A systematic review of discrimination and fairness by algorithmic decision-making in the context of HR recruitment and HR development. *Business Research, 13*(3), 795–848.

32. Kristensson, P., Matthing, J., & Johansson, N. (2008). Key strategies for the successful involvement of customers in the co-creation of new technology-based services. *International journal of service industry management*, *19*(4), 474-491.

33. Kunte, M., Mathew, J., & Choudhary, A. (2025). Microlearning: Its adaptation, challenges, and path ahead. In *Human-Centric AI in Digital Transformation and Entrepreneurship* (pp. 209–226). IGI Global Scientific Publishing.

34. Larsson, J., & Revland, S. (2023). Trust and knowledge sharing in hybrid project teams.

35. Leong, K., Sung, A., Au, D., & Blanchard, C. (2021). A review of the trend of microlearning. *Journal of Work-Applied Management, 13*(1), 88–102.

36. McKinsey. (2024). The state of AI in 2024: Generative AI's breakout year. McKinsey & Company Report.

37. McLeod, K., Thakchoe, S., Hunter, M. A., Vincent, K., Baltra-Ulloa, A. J., & MacDonald, A. (2020). Principles for a pedagogy of unlearning. *Reflective Practice, 21*(2), 183–197.

38. Mir, A. I. (2024). Application of AI in talent management: a systematic review of benefits, challenges, and prospects. *Academy of Education and Social Sciences Review*, *4*(4), 612-630.

39. McGill, M. E., & Slocum, J. W. (1993). Unlearning the organization. *Organizational Dynamics, 22*(2), 67–79.

40. Mosqueira-Rey, E., Hernández-Pereira, E., Alonso-Ríos, D., Bobes-Bascarán, J., & Fernández-Leal, Á. (2023). Human-in-the-loop machine learning: A state of the art. *Artificial Intelligence Review, 56*(4), 3005–3054.

41. Mosakowski, E., Calic, G., & Earley, P. C. (2013). Cultures as learning laboratories: What makes some more effective than others? *Academy of Management Learning & Education, 12*(3), 512–526.

42. Mull, M., Duffy, C., & Silberman, D. (2023). Forgetting to learn and learning to forget: The call for organizational unlearning. *European Journal of Training and Development, 47*(5/6), 586–598.

43. Narleva, Kamelia & Gancheva, Yana. (2023). The Role of Maritime Education in Digitalization. Pedagogika-Pedagogy. 95. 132-141. 10.53656/ped2023-6s.12.

44. Nyberg, A. J., Schleicher, D. J., Bell, B. S., Boon, C., Cappelli, P., Collings, D. G., ... & Yakubovich, V. (2025). A brave new world of human resources research: Navigating perils and identifying grand challenges of the GenAI revolution. *Journal of Management*. Advance online publication.

45. Smith, J., & Jacob, R. (2024). Big data governance in financial risk control systems.

46. Siburian, J., & Mardiyanti, L. (2023). Prediction of meta-skills based on metacognition. *Jurnal Penelitian Pendidikan IPA, 9*(12), 11053–11059.

47. Soleimaninejad, A., Zarei Metin, H., Hejazi, S. R., Moghimi, S. M., & Yazdani, H. (2024). Re-identification of entrepreneurial personality competencies through a meta-synthesis approach. *Journal of Human Resource Management, 14*(4), 1–32.

48. IBM. (2024). The enterprise guide to closing the skills gap: IBM study on half-life of skills.

49. Stypinska, J. (2023). AI ageism: a critical roadmap for studying age discrimination and exclusion in digitalized societies. *AI & society*, *38*(2), 665-677.

50. Susskind, D. (2020). *A world without work: Technology, automation and how we should respond*. Penguin UK.

51. Susskind, R. E. (2023). *Tomorrow's lawyers: An introduction to your future*. Oxford University Press.

52. Teece, D. J. (2020). Hand in glove: Open innovation and the dynamic capabilities framework. *Strategic Management Review*, *1*(2), 233-253.

53. Petit, N., & Teece, D. J. (2020). Taking ecosystems competition seriously in the digital economy: A (preliminary) dynamic competition/capabilities perspective.

54. *Schwab, K., & Zahidi, S. (2020). The Future of Jobs Report* (Historical benchmark)

55. Tambe, P., Cappelli, P., & Yakubovich, V. (2019). Artificial intelligence in human resources management: Challenges and a path forward. *California Management Review, 61*(4), 15–42.

56. Teece, D. J. (2023). The evolution of the dynamic capabilities framework. *Artificiality and sustainability in entrepreneurship*, *113*, 238.

57. Teece, D. J. (2023). Evolutionary economics, routines, and dynamic capabilities. In *Routledge Handbook of Evolutionary Economics* (pp. 197-214). Routledge.

58. Unilever. (2024). Flex experiences program: Building workforce agility. Company Report.

59. *World Economic Forum. (2025). Future of Jobs Report* (Empirical skills data)

60. Yadollahi, A., & Yazdani, S. (2020). Defining cognitive, higher order thinking, and psychomotor meta-skills: three-curricular content concept analysis. *Journal of Medical Education*, *19*(3), e110334.

ISSN (Online): 2815-5084

INTERNATIONAL SCIENTIFIC AND PRACTICAL CONFERENCE ON HUMAN RESOURCE MANAGEMENT
DOI: 10.56065/HRM/2026.59, pp. 59 – 63

7th edition, 3 October 2025
University of Economics – Varna

# Enhancing communication in virtual teams through Business Process Management

**Ina PETROVA-GANCHEVA**[1]

[1] PhD Student, Faculty of Economics and Business Administration, Sofia University „St. Kliment Ohridski“, Sofia, Bulgaria, ippetrova1@uni-sofia.bg

**JEL: M12, M15, M54**

**Abstract**

Virtual teams are an integral part of modern organizations, yet their effectiveness depends heavily on communication. While Business Process Management (BPM) is traditionally associated with process optimization and workflow management, its potential role in improving communication within virtual teams remains unexplored. This paper examines how BPM can enhance communication by resolving conflicts, defining responsibilities, and connecting team members across boundaries; *Scope*: The research is conceptual in nature and grounded in a review of existing literature, without empirical testing; *Methods*: A review of academic literature on BPM and virtual teams was conducted; *Conclusions*: BPM supports communication in virtual teams by dividing roles, structuring task allocation, and reducing misunderstandings; *Originality*: The paper contributes by framing BPM not only as a process optimization tool but also as a communication enabler in virtual settings; *Practical implications*: Managers can use BPM to reduce communication barriers in virtual teams and strengthen collaboration.

**Key words:**
Virtual teams, communication, business process management, conflict management

**Published by University of Economics – Varna**

*Citation:* Petrova-Gancheva, I. (2026). Enhancing Communication in Virtual Teams through Business Process Management *Proceedings from 7th International Scientific and Practical Conference on Human Resource Management (ICHRM).* University of Economics – Varna, pp. 59 – 63. DOI: 10.56065/HRM/2026.59

## 1. Introduction

Globalization, the development of social media, and the COVID-19 pandemic have all had an impact on the way we work, increasing the number of people working remotely. This, in turn, has changed the job skills required from employees, placing greater emphasis on communication skills, which are increasingly being considered in the context of remote work. As a result, virtual teams and communication between their members – particularly conflict management, synergies, and feedback – have become a trending topic.

At the same time, many organizations worldwide implement Business Process Management (BPM) on a large scale. While its main purposes so far have been process optimization and workflow management, additional benefits such as enhanced digital communication need to be further investigated. The aim of this paper is therefore to explore whether studies in the academic literature address the role of processes in enabling smooth communication in virtual teams.

## 2. Key concepts related to business processes and virtual teams

Weske (2019) defines a business process as a set of activities coordinated from both organizational and technical perspective. The execution of such activities leads to the achievement of a specific organizational goal. Each individual business process is performed within a single organization but may also interact with business processes in other organizations (Weske, 2019, p. 5).

In processes, activities and decisions which are carried out by process roles. Process roles can be internal or external to a given organization (Dumas *et al.*, 2018, p. 4). A role, in the context of a process, illustrates the performer of a specific activity or decision. Typically, process roles are also arranged in organizational charts that visualize the structure of a given team, department, or the entire organization.

Business process management (BPM) is a comprehensive system for managing and transforming organizational activities (Hammer, 2008, p. 3). It includes „concepts, methods, and techniques to support the design, administration, configuration, enactment, and analysis of business processes" (Weske, 2019, p. 5). While traditional BPM practices such as performance measurement and optimization are relatively well developed and often included in various studies, the role of the human factor in BPM is less frequently emphasized. However, according to Tuček and Hrabal (2014), underestimating this factor is crucial for the organization (Tuček and Hrabal, 2014, p. 264). The so-called social BPM, or often referred to as human-centric BPM, is regarded as a combination of social technologies and process management so that those involved in BPM and the employees participating in the processes can collaborate and share knowledge more effectively (Palmer and Swenson, 2011, p. 193).

Business process management systems (BPMS) are software systems that represent a set of process visualizations used to coordinate the execution of business processes (Weske, 2019, p. 6). These systems describe the execution of a given process, which can be either automated or performed by the organization's human resources (Cabanillas *et al.*, 2013, p. 2).

A virtual team is a group of geographically, organizationally, or temporally dispersed workers united by information technology to perform one or more organizational tasks (Powell, Piccoli and Ives, 2004, p. 7). According to Olariu and Aldea (2014) the main factor enabling the existence of virtual teams is information technology (Olariu and Aldea, 2014, p. 381). Virtual team members coordinate their work primarily through digital communication channels such as e-mail and video conferencing (Hertel, Geister and Konradt, 2005, p. 69). This differs from physical teams, where face-to-face communication is a substantial part of the daily work routine. Direct verbal communication fosters quick feedback. Sharing common office spaces also encourages employees from physical teams to seek advice directly from more experienced colleagues when faced with an unfamiliar work situation. As opposed to the virtual work environment, where time zones hinder rapid feedback. Physical isolation between virtual team members often makes asking a colleague for advice a rather frustrating experience, especially for new hires. In such cases, employees must rely on clearly documented processes for guidance.

It is now generally accepted that both on-site working and fully remote work arrangements both have positive and negative aspects, especially in terms on employee communication. Table 1 summarizes part of them.

**Table 1**

**Comparison between physical vs. virtual teams**

| Physical teams | Virtual teams |
|---|---|
| Team members share a common office space | Geographically dispersed team members |
| Face-to-face communication | Digital communication |
| Quick feedback | Delay in feedback due to different time zones |
| Easier to ask a team member when in doubt | Easier to follow the process when in doubt |
| Knowledge shared informally | Knowledge sharing is formalized |

*Source: Authors' Compilation, 2025*

### 3. Improving Communication in Virtual Teams through BPM

Due to globalization and the COVID-19 pandemic, remote working and virtual teams have gained importance and popularity, yet their management comes with distinct challenges. A study conducted by OnPoint Consulting among 427 employees and managers shows that the three main challenges facing virtual teams are: lack of personal contact with team members (46%), lack of resources (37%), and time zone

differences that hinder collaboration (29%) (OnPoint Consulting LLC, 2011, p. 4). A study by MIT Sloan Management Review among 70 virtual teams found that only about 18% rated their performance as highly successful (Govindarajan and Gupta, 2001, pp. 1–2). Virtual teams, per se, are not inefficient; rather, their performance depends largely on the processes and tools that structure communication. Hence, it is valuable to find out how BPM could enhance communication in virtual teams by connecting team members effectively despite time zones, language barriers and lack of personal contact.

It is important to consider the role of processes as a prerequisite for better communication within teams. One of the essential aspects of team communication are conflicts. They are inherent in organizations and often arise from poor communication (Vedar, 2014, p. 156). Wakefield, Leidner, and Garrison (2008) write that technology-mediated communication contributes to reducing various types of team conflicts (Wakefield, Leidner and Garrison, 2008, p. 2008). This is where BPM and BPMS play a critical role. BPMS serve as tools for structuring communication. They are platforms where tasks are described and assigned to roles performed by different team members. BPMS can be viewed as „navigation systems“ that guide the workflow in organizations (van der Aalst, 2021, p. 321). Thus, BPMS function as digital channels that positively impact task, process, and relationship management, especially in virtual teams. In increasingly remote work environments, BPMS are particularly relevant, as the written word often carries greater weight than the spoken word.

Wakefield, Leidner and Garrison (2008) present the types of conflicts that arise in teams when communication is underdeveloped. The first type is *task conflict*, which occurs when knowledge about tasks is not fully understood or shared by all team members. This conflict originates in misunderstandings or disagreements about the activities needed to achieve team goals. The result may be disagreements about work steps, task selection, or task distribution. The second type is *process conflict*, which occurs when members disagree on the methods and processes necessary to accomplish tasks. In a study with 159 of virtual team members from industries such as telecommunications, construction, finance, and consulting, Wakefield, Leidner, and Garrison (2008) demonstrate that greater use of technology reduces conflicts. Virtual teams that rely more heavily on technology-mediated communication are more likely to engage in knowledge sharing about tasks and processes, which leads to fewer conflicts over both (Wakefield, Leidner and Garrison, 2008, p. 435).

Communication is the most important factor for the success of virtual teams, according to Olariu and Aldea (2014). The authors explore ways to improve communication in virtual teams through BPM (Olariu and Aldea, 2014, p. 380). In this regard, Fleischmann, Schmidt, and Stary (2013) write that the so-called social BPM represents a new model for information exchange, rather than simply designing a sequence of activities that specify specific details of employee behavior. If necessary, the latter can be done by the employees themselves. This increases their level of independence and establishes them as responsible members of the organization. Designing and adapting processes fosters internal consistency, reduces reliance on external factors, and positively impacts satisfaction, motivation, and commitment. This leads to optimized behavior of the entire organization in the sense of a social system with a high degree of individual work organization and has a positive impact on employee satisfaction, work motivation, and their desire to contribute to organizational development (Fleischmann, Schmidt and Stary, 2013, p. 404). For example, when a process is performed at several locations in a multinational organization, the social approach to BPM promotes synergies between employees at different locations. Employees understand their contribution within the larger organization.

Another challenge concerns the mix of work arrangements that are available to employees nowadays – between on-site and remote working, or the so-called hybrid model. Combining office presence with online work often leads to fragmented communication, information gaps and so on. Following strict processes is a prerequisite to execute and communicate consistently regardless of the office presence. Figure 1 illustrates the listed positive aspects of BPM in terms of organizational communication.




**Fig. 1 Dimensions of BPM in the context of organizational communication**

*Source: Authors' Compilation, 2025*

Of course, relying on BPM to enhance communication in virtual teams could have downsides as well. One of the challenges in implementing IT systems is getting people to use them as intended. There are numerous examples of expensive IT investments that have been rejected by employees and never fully utilized in the organizational reality (Cameron and Green, 2009, p. 303). Employees must also have time to explore and familiarize themselves with the capabilities of these systems so that they can use them in the best possible way (Cameron and Green, 2009, p. 305). A possible solution is to use gamification. The gamification of the process approach is particularly relevant in the context of virtual teams. Santórum and Front (2011) conducted qualitative research to test the acceptability and feasibility of this method and developed a role-playing simulation tool for process management in virtual environment (Santórum and Front, 2011, p. 12).

## 4. Conclusion

In conclusion, BPM extends beyond process optimization to serve for improving communication within virtual teams. BPM fosters trust and collaboration between virtual team members.

Clear communication is often assumed to be sufficient, but in virtual environments *de facto* formalized processes are equally crucial. While BPM is generally regarded as a tool for process optimization and performance tracking, this paper emphasizes its function as a communication tool. BPM, among other things, contributes to reducing conflicts by clarifying task responsibilities. Virtual teams have advantages over physical teams. Virtual teams offer significant opportunities despite the challenges of managing them. In fact, with the right processes in place, virtual teams can significantly outperform physical teams. Clear processes lead to better understanding of the work on the part of the virtual team members. Communication improves when the virtual team has well defined goals, a clear direction, and everyone understands their role, and the interaction between team members is regulated (Olariu and Aldea, 2014, p. 381). Ultimately, good communication requires good processes – and good processes foster effective communication.

A limitation of this paper is that it is conceptual, empirical validation is needed. Future research could empirically test the conceptual assumptions presented in this paper by collecting quantitative data on how specific BPM practices influence communication in virtual teams.

## References

1. Cabanillas, C. et al. (2013) 'Priority-based human resource allocation in business processes', in Lecture Notes in Computer Science (including subseries Lecture Notes in Artificial Intelligence and Lecture Notes in Bioinformatics), pp. 374–388. Available at: https://doi.org/10.1007/978-3-642-45005-1_26.

2. Cameron, E. and Green, M. (2009) Making sense of change management: a complete guide to the models, tools & techniques of organizational change. Kogan Page.

3. Dumas, M. et al. (2018) Fundamentals of business process management: Second Edition. Available at: https://doi.org/10.1007/978-3-662-56509-4.

4. Fleischmann, A., Schmidt, W. and Stary, C. (2013) 'Subject-oriented BPM = socially executable BPM', in Proceedings – 2013 IEEE International Conference on Business Informatics, IEEE CBI 2013. IEEE Computer Society, pp. 399–406. Available at: https://doi.org/10.1109/CBI.2013.64.

5. Govindarajan, V. and Gupta, A.K. (2001) Building an Effective Global Business Team. Available at: https://sloanreview.mit.edu/article/building-an-effective-global-business-team/.

6. Hammer, M. (2008) 'What is Business Process Management?', in J. vom Brocke and M. Rosemann (eds.) Handbook on Business Process Management 1: Introduction, Methods, and Information Systems. Available at: https://doi.org/10.1007/978-3-642-45100-3.

7. Hertel, G., Geister, S. and Konradt, U. (2005) 'Managing virtual teams: A review of current empirical research', Human Resource Management Review, 15(1), pp. 69–95. Available at: https://doi.org/10.1016/j.hrmr.2005.01.002.

8. Olariu, C. and Aldea, C.C. (2014) 'Managing Processes for Virtual Teams – A BPM Approach', Procedia – Social and Behavioral Sciences, 109(0), pp. 380–384. Available at: https://doi.org/10.1016/j.sbspro.2013.12.476.

9. OnPoint Consulting LLC (2011) Success Factors of Top Performing Virtual Teams.

10. Palmer, N. and Swenson, K.D. (2011) Social BPM: Work, Planning and Collaboration Under the Impact of Social Technology.

11. Powell, A., Piccoli, G. and Ives, B. (2004) 'Virtual Teams: A Review of Current Literature and Directions for Future Research', The Database for Advances in Information Systems [Preprint].

12. Santórum, M. and Front, A. (2011) A serious game-based method for business process management. Available at: https://www.researchgate.net/publication/322832465.

13. Tuček, D. and Hrabal, M. (2014) The Role of Human Factor in Business Process Management Projects.

14. Van der Aalst, W. (2021) Process Mining. Available at: https://doi.org/10.1007/978-981-16-2842-9_7.

15. Vedar, O. (2014) Human resource management.

16. Wakefield, R.L., Leidner, D.E. and Garrison, G. (2008) 'A model of conflict, leadership, and performance in virtual teams', Information Systems Research, 19(4), pp. 434–455. Available at: https://doi.org/10.1287/isre.1070.0149.

17. Weske, M. (2019) Business Process Management. Available at: https://doi.org/10.1007/978-3-319-04175-9_1.

ISSN (Online): 2815-5084

INTERNATIONAL SCIENTIFIC AND PRACTICAL CONFERENCE ON HUMAN RESOURCE MANAGEMENT
DOI: 10.56065/HRM/2026.64, pp. 64 – 69

7th edition, 2 – 3 October 2025
University of Economics-Varna

# The National Electronic Information System for Pre-school and School Education (NEISPUO) as a Tool for Effective Human Resource Management in Education

**Dean VASILEV**[1]

[1] Department of Informatics, University of Economics, Varna, Bulgaria, dean.vasilev@ue-varna.bg

**JEL: I21, M50**

**Abstract**

This paper examines the potential of the National Electronic Information System for Pre-school and School Education (NEISPUO) as a tool for effective human resource management in Bulgarian educational institutions. The main functionalities of the system related to maintaining personnel data, tracking teachers' workload and employment, and supporting administrative processes are analyzed. Based on an author's analytical approach, the advantages of the system are outlined — increased transparency, process standardization, and opportunities for strategic planning. At the same time, the challenges arising from the current version's limitations are identified, such as incomplete integration with other digital HR solutions and the lack of functionalities for competence profiling and professional development of teaching staff. The paper concludes with recommendations for the future development of NEISPUO aimed at achieving more comprehensive and effective management of human capital in education.

**Published by University of Economics – Varna**

**Key words:**
Human Resource Management, Digital Transformation, School Administration, NEISPUO

*Citation:* Vasilev, D. G. (2026). The National Electronic Information System for Pre-school and School Education (NEISPUO) as a Tool for Effective Human Resource Management in Education. *Proceedings from 7th International Scientific and Practical Conference on Human Resource Management (ICHRM).* University of Economics – Varna, pp. 64 – 69. DOI: 10.56065/HRM/2026.64

## 1. Introduction

Digital transformation has been established as a key factor for modernizing management processes in both the public and private sectors. In the field of education, it is of particular importance, as the effective administration and development of human resources are directly related to the quality of the educational process and the sustainable growth of institutions. The management of teaching and administrative staff in schools requires reliable tools for collecting, processing, and analyzing information to support decision-making.

In this context, the National Electronic Information System for Pre-school and School Education (NEISPUO) occupies a central place as the main platform for the digitalization of administrative processes in Bulgarian schools. Although the system was initially designed to provide standardized data and administrative accountability, it also offers a range of opportunities for human resource management.

The purpose of this paper is to analyze the potential of NEISPUO as a tool for managing personnel in education, identifying both the benefits and the limitations of the system. The study aims to highlight its potential for development as a strategic HR instrument in the context of digital transformation.

## 2. Management of Human Resources in the Education Sector

Human resources are considered the most important organizational factor determining the success of any institution. The theory of human capital emphasizes that investments in people's knowledge, skills, and development are the most effective form of organizational investment, as they lead to sustainable competitive advantage and high adaptability to the changing environment (Dikova, 2018). In the school context, this means that teachers and educational staff are the most valuable resource defining the quality of education.

Human resource management in schools has its own specific characteristics compared to the business

sector. While enterprises often focus on economic outcomes, in education the goal is to achieve high educational results, ensure students' socialization, and build a positive school environment. According to Staribratov (2020), effective human resource management is critical for the school's image and involves not only the principal but also every teacher who manages his or her class and communication with parents. This transforms the role of the school principal from administrator to manager, while teachers can also be viewed as „classroom managers."

The main processes in human resource management in schools include workforce planning, recruitment and selection, onboarding and adaptation of newly appointed staff, performance appraisal and evaluation, continuous professional qualification and training, career development, motivation, and effective communication within the team. All these processes are united by the understanding that teachers' motivation and professional growth have a direct impact on students' achievements and on the overall efficiency of the institution.

In recent years, the concept of the „learning organization" has become increasingly prominent in both the theory and practice of human resource management. According to Dikova (2017), schools can be viewed as learning organizations where teachers actively participate in organizational learning, acquire new knowledge, take part in decision-making, and are motivated through appropriate incentives. This approach ensures sustainable development, innovation, and higher staff engagement.

Alongside the opportunities, human resource management in Bulgarian education faces a number of challenges. These include the aging teaching workforce, the shortage of young professionals, and the need for modern mechanisms to motivate and retain valuable specialists. Increasingly urgent is the introduction of competence models and standards that unify expectations toward teachers and support their professional growth (Varadinova & Gergova, 2020).

Therefore, human resource management in schools represents a key element of the strategic management of educational institutions, as its effectiveness is directly related to the quality of the education provided.

## 3. Human Resource Management Information Systems

### 3.1. Human Resource Management Information Systems: Nature and Application in Education

The development of information technologies has led to the emergence of specialized Human Resource Management Information Systems (HRMIS). These systems combine the traditional functions of personnel management with the capabilities of digital technologies, ensuring higher efficiency, transparency, and reliability of management processes. In organizations, HRMIS are used for administering personnel data, managing employment contracts, performance evaluation, and planning staff training and development.

In the field of education, the implementation of HRMIS is particularly important, as schools rely on accurate and timely information about their teachers and staff. Experience from international practice shows that such systems increase the capacity of school leaders to make informed decisions related to career development, leave management, retirement, and teacher qualification. For instance, in the province of Punjab (Pakistan), a web-based HRMIS was introduced in 2019 for school education, incorporating modules for electronic leave management, teacher performance evaluation, retirement and pension procedures, and staff data verification. Research indicates that the system improves transparency and administrative efficiency but also highlights challenges related to the need for training school principals to use it effectively.

Similar approaches exist in other countries through Educational Management Information Systems (EMIS), which support integrated management of data related to students, teachers, and institutional resources (Shah, 2008; Majid, 2010). The main advantage of such systems lies in their ability to provide reliable databases for strategic educational planning and to support the development of human capital in the sector.

In this sense, human resource management information systems in education can be viewed not only as technical tools for administrative reporting but also as strategic instruments for developing school personnel. They create conditions for better workforce planning, greater transparency in decision-making, and enhanced efficiency in managing human capital.

### 3.2. The National Electronic Information System for Pre-school and School Education (NEISPUO) as a Tool for Human Resource Management

In recent years, the digitalization of educational governance in Bulgaria has been realized through the creation and implementation of the National Electronic Information System for Pre-school and School Education (NEISPUO). The system was developed on the initiative of the Ministry of Education and Science with the aim of providing a centralized, reliable, and integrated database for the educational process and the functioning of educational institutions. It operates as a strategic management instrument that supports decision-making at all administrative levels — from school principals and regional education departments to the Ministry itself. Before NEISPUO was introduced, most schools maintained personnel records in isolated local systems or on paper, which impeded transparency and slowed down administrative processes at the school, regional, and national levels. For this reason, the system was developed as part of the broader national strategy for the digital transformation of education (2018–2030), with the goal of creating a unified information environment that supports data-driven management.

NEISPUO is built on a modular architecture that integrates several subsystems, each supporting different aspects of educational governance. These include: (1) an administrative data module with institutional profiles; (2) a personnel management module containing detailed records of staff; (3) a student and class management module; (4) a reporting and analytics module; and (5) a data protection and security module ensuring compliance with GDPR and national legislation. The integration of these subsystems allows authorized users to access up-to-date and verified information through secure web services, significantly improving the reliability and timeliness of educational data.

A key advantage of NEISPUO is its interoperability with other national platforms. The system communicates with the electronic register of pedagogical specialists, the database of teacher qualification programs, and the national map of educational infrastructure. This interoperability enables the Ministry of Education and Science to combine information from multiple sources and generate comprehensive workforce indicators such as qualification levels, regional shortages of staff, expected retirements, and long-term personnel needs. As a result, NEISPUO functions not only as an administrative tool but also as a foundation for national educational planning and policy development.

Although initially designed as a platform for administrative reporting and statistical planning, NEISPUO has gradually evolved into a valuable instrument for human resource management in the educational sector. In the context of HR management in education, the system can be viewed as part of a national model for digital personnel administration. It facilitates administrative procedures, reduces bureaucratic workload, and creates conditions for decision-making based on accurate data.

The system provides functionalities that enable school principals to maintain up-to-date personnel records, monitor teachers' professional qualifications and career development, manage workload and timetable allocation, and exchange data electronically with regional and national educational authorities. In this way, NEISPUO ensures a high level of transparency and traceability in processes related to staff management.

Through its modules, the system automates several key HR processes, including:

- Workforce planning and reporting – maintaining an up-to-date register of teaching staff and positions;
- Evaluation and attestation – electronic entry and monitoring of assessment and qualification results;
- Tracking professional development – recording participation in training and completed qualification levels;
- Support for strategic planning – analysis of employment trends and staffing needs.

From a practical perspective, the system provides school leaders with functionalities that facilitate the daily management of human resources. Principals can update personnel records, verify employment status, track completed training, and manage workload distribution. The platform supports standardized processes such as staff appraisal and reporting of professional development. These functionalities reduce administrative workload and minimize the risk of data inconsistencies.

A useful illustration of NEISPUO's practical value can be seen in the management of qualification procedures. When a teacher applies for an upgraded qualification level or for promotion, the system enables

the principal to verify relevant data — such as years of experience, previous evaluations, completed training, and additional professional achievements — within seconds. This integrated and automated process shortens administrative timelines and ensures fairness and consistency across institutions. Similarly, regional education departments can quickly identify schools with critical staffing needs and respond more effectively by reallocating resources or implementing targeted recruitment measures.

Despite its significant advantages, the practical implementation of NEISPUO presents several challenges. These include the need to strengthen the digital competence of school leaders and administrative staff, the requirement for adequate technical infrastructure, and the necessity for continuous improvement of the system's functionalities. Some schools still encounter difficulties in entering and maintaining data, particularly in cases where technical support or user training is insufficient.

In the long term, the development of NEISPUO as an HR tool may contribute to a more effective and sustainable policy for human capital management in education. By integrating analytical modules and competence profiles, the system has the potential to become the foundation for strategic workforce planning and modern, data-driven educational management.

### 3.3. Application and Opportunities of NEISPUO for Human Resource Management in Education

Effective human resource management in education requires accurate, coherent, and timely information regarding the status, qualifications, and professional development of staff. In this context, the National Electronic Information System for Pre-school and School Education (NEISPUO) has emerged as a key instrument integrating a wide range of administrative and strategic functions into a unified digital environment. Through its comprehensive structure, the system supports numerous processes related to the management of human capital at school, regional, and national levels.

At the operational level, NEISPUO provides a centralized personnel database containing detailed information on all teaching and non-teaching staff, including their positions, qualifications, years of experience, workload distribution, appraisal results, and participation in professional development activities. Unified procedures for data entry and verification significantly reduce discrepancies between schools and eliminate the need for parallel local systems. This creates a solid foundation for consistent workforce monitoring and enables more accurate forecasting of future staffing needs.

The system also facilitates the administration of teacher appraisal and professional development processes. Through its qualification and evaluation modules, NEISPUO allows school leaders to monitor participation in training, track progress toward qualification levels, and record evaluation results. These functionalities play an essential role in aligning individual professional development with school improvement plans and in ensuring compliance with national regulatory requirements. The system thus supports both institutional HR planning and the continuous enhancement of teacher competencies.

In addition, NEISPUO contributes to efficient workload planning and timetable management. Through real-time tools, school principals can monitor available subject specialists, identify potential shortages or imbalances, and ensure compliance with workload regulations. This functionality reduces administrative errors and supports timely organizational adjustments in cases of staff absences, vacancies, or changes in student enrolment.

A major advantage of NEISPUO is the improved coordination between schools, Regional Education Departments, and the Ministry of Education and Science. Schools submit staff-related data electronically, while regional and national authorities can validate and analyze this information without duplicating administrative work. This streamlined communication accelerates decision-making and allows management to rely on current and reliable indicators. For example, when the Ministry identifies municipalities experiencing critical teacher shortages, it can respond promptly with targeted recruitment campaigns, financial incentives, or mobility programs.

From a strategic perspective, the analytical capabilities of NEISPUO represent one of its strongest features. The system provides dashboards and statistical tools for analyzing staffing trends, retirement projections, regional disparities in subject qualifications, and teacher turnover rates. Access to such data

supports evidence-based policy development and long-term strategic HR planning. For instance, age-distribution analyses can inform succession planning and the design of targeted programs aimed at attracting young teachers to regions with acute shortages.

To realize its full potential as an HR management tool, NEISPUO can be further enhanced with new functionalities. The introduction of competence-based profiles would enable a more precise alignment between teachers' skills and their professional roles. The integration of digital teacher portfolios would provide a more complete view of professional experience, achievements, training, and innovative teaching practices. Such additions would position NEISPUO within a human capital management model where emphasis is placed on development, motivation, and long-term career planning.

Despite its strengths, the system faces several challenges. Variations in digital competence among administrative and teaching staff may result in inconsistent or inaccurate data entry. In certain regions, limitations in technical infrastructure can hinder the effective use of the system. Additionally, although the analytical modules provide valuable insights, they still have potential for further development—particularly in the direction of automated forecasting of staffing needs and identification of risk trends. Addressing these challenges requires continuous user training, technical support, and improvements to the system's interface to ensure its usability across diverse school environments.

Overall, NEISPUO offers substantial opportunities for transforming human resource management within the Bulgarian education system. By integrating key processes, enhancing transparency, and supporting data-driven decision-making, the system contributes to a more professional, accountable, and strategically oriented HR management environment. Future development—particularly in the areas of competence modelling, automated analytics, and personalized professional development—can further strengthen its role as a cornerstone of modern educational governance and a key instrument for managing human capital at all levels of the education system.

**Conclusion**

Human resource management in education is becoming increasingly significant in the context of digital transformation and the growing need for modern management practices. The analysis demonstrated that human capital is the key factor for ensuring quality and sustainability within the educational system, and its effective management requires reliable information tools and a systematic approach.

Contemporary human resource management information systems used in international practice have proven their role in improving efficiency, transparency, and coordination in staff management. In this context, the Bulgarian National Electronic Information System for Pre-school and School Education (NEISPUO) represents an important step toward the digitalization of management and the strategic development of human capital in education.

The author's analytical findings highlight the system's main functional capabilities — centralized management of personnel information, electronic reporting, evaluation and attestation, monitoring of professional qualification, and support for decision-making. NEISPUO already contributes to enhanced administrative efficiency and control, but further improvement of its modules is needed to enable deeper analysis of competencies and career development among teaching staff.

In the future, the system could evolve into a comprehensive tool for strategic human resource management through the integration of analytical components, competence profiles, and connections to national platforms for teacher qualification. Such development would support the transition from administrative to data-driven management, facilitating workforce planning and improving the quality of education.

In conclusion, NEISPUO can be viewed as the foundation for building a modern model of human resource management in Bulgarian education — one that combines technology, good governance, and a focus on people as the most valuable asset of every school.

**References**

1. Dikova, I. (2017). *The learning organization in the context of educational management.* Pedagogika, 89(3), 221–233.

2. Dikova, I. (2018). *Human capital development and its significance for educational institutions.* Izvestiya Journal, 62(1), 45–56.

3. Majid, A. (2010). *Impact of Education Management Information System on decision making: A study of Pakistan.* Journal of Education and Practice, 1(3), 23–29.

4. Shah, S. M. (2008). *Educational Management Information Systems and strategic planning.* International Journal of Education Management, 22(4), 298–310.

5. Staribratov, I. (2020). *Human resource management in school: Challenges and opportunities.* Education and Technologies, 11(2020), 188–193.

6. Varadinova, Y., & Gergova, N. (2020). *Competence models and modern approaches to human resource management.* Transport and Communications, 18(3/1), 8–11.

7. Ministry of Education and Science (2018). *National Strategy for the Digital Transformation of Education 2018–2030.* Sofia: ME

ISSN (Online): 2815-5084

INTERNATIONAL SCIENTIFIC AND PRACTICAL CONFERENCE ON HUMAN RESOURCE MANAGEMENT
DOI: 10.56065/HRM/2026.70, pp. 70 – 75

7th edition, 2 – 3 October 2025
University of Economics-Varna

# The Application of Artificial Intelligence in Higher Education: Learner-Centred Software Systems and Digital Accessibility for Students with Disabilities

**Nikolay NIKOLOV**[1]

[1] Department of Informatics, University of Economics, Varna, Bulgaria, nikolay.nikolov@ue-varna.bg

**JEL: O14, P24, C41, E13**

**Abstract**

Artificial intelligence (AI) is transforming higher education by enabling new forms of personalisation, automation and data-driven decision-making. This paper examines how AI is applied in higher education, with a particular focus on software systems for delivering learner-centred educational services and on digital accessibility for students with disabilities.

The paper concentrates on higher education institutions and digital learning environments, with emphasis on teaching and learning processes rather than administrative or purely research uses of AI.

The study adopts a narrative literature review of recent international research on AI in higher education, combined with illustrative examples from Bulgarian practice and selected publications from the University of Economics – Varna on mobile AI applications, natural language processing (NLP), web technologies and learner-centred systems.

The analysis identifies five main domains of AI application: intelligent and adaptive learning systems, AI-enhanced learning management systems (LMS), chatbots and virtual assistants, learning analytics, and AI-driven assistive technologies. These domains support personalisation, early identification of learning difficulties, and improved accessibility.

AI has a strong potential to enhance learner-centred and inclusive higher education but raises significant ethical, legal and organisational challenges. The paper integrates the perspective of digital accessibility and students with disabilities into a broader discussion of AI in higher education, linking international literature with concrete institutional experience. The findings can inform institutional strategies for AI adoption, design of learner-centred digital platforms, and development of inclusive policies and services for students with disabilities.

**Published by University of Economics – Varna**

**Key words:**
artificial intelligence, higher education, adaptive learning, digital accessibility, students with disabilities, learner-centred systems, intelligent tutoring systems.

*Citation:* Nikolov, N. (2026). The Application of Artificial Intelligence in Higher Education: Learner-Centred Software Systems and Digital Accessibility for Students with Disabilities. *Proceedings from 7th International Scientific and Practical Conference on Human Resource Management (ICHRM).* University of Economics – Varna, pp. 70 – 75. DOI: 10.56065/HRM/2026.70

## 1. Introduction

Artificial intelligence (AI) has rapidly evolved from a specialised research domain into a pervasive technological paradigm affecting all sectors of the economy and society. Higher education institutions (HEIs) increasingly explore and adopt AI solutions to support teaching, learning, assessment and student services. Recent systematic reviews report a sharp increase in scholarly publications on AI in higher education in the last five years, especially following the emergence of large generative models and conversational systems (Bond, 2024; Garzón, 2023; Wang et al., 2024).

These reviews highlight several potential benefits of AI in education: enhanced personalisation of learning, more accurate and timely identification of students at risk, automation of routine tasks for instructors and expanded access to diverse learning resources (Bond, 2024; Wang et al., 2024). At the same time, they point to persistent concerns regarding academic integrity, transparency of algorithms, data protection and the risk of reinforcing existing social inequalities.

One particularly important perspective is the role of AI in supporting inclusive education and digital accessibility for students with disabilities. AI-based assistive technologies – such as automatic captioning, text-to-speech and speech-to-text tools, intelligent screen readers and mobile applications – can significantly reduce barriers to participation in higher education (Fitas, 2025; Nacheva, 2025). However, their effective integration requires not only technological solutions but also pedagogical, organisational and ethical adjustments.

The aim of this paper is to analyse the application of AI in higher education with emphasis on:

- software systems and platforms for delivering learner-centred educational services;
- AI-driven approaches to digital accessibility and support for students with disabilities;
- ethical, legal and organisational issues related to AI adoption.

The paper combines findings from international literature with examples from the Bulgarian context, including work by Nacheva (2024; 2025), Sulova (2024), Bankov (2023), Stamenova (2023) and Nikolov (2023; 2024), who explore AI-based mobile applications, NLP for e-learning resources, web technologies and learner-centred systems in higher education.

## 2. Theoretical Background: AI in Higher Education

### 2.1. Core AI technologies relevant to higher education

AI encompasses a broad range of techniques, several of which are particularly important for higher education:

- **Machine learning (ML)** is used to build models that learn from data. In educational settings, ML is applied to predict dropout, classify error types, recommend learning resources, and estimate the probability of successful course completion (Garzón, 2023; Wang et al., 2024).
- **Deep learning** employs multilayer neural networks for complex tasks such as image recognition, speech recognition and video analysis. These models can support automatic analysis of lecture recordings, extraction of key topics, or detection of patterns in learner behaviour.
- **Natural language processing (NLP)** enables the analysis and generation of text. Typical use cases in higher education include automated summarisation, language simplification, feedback on writing, semantic search in learning materials and dialog systems (chatbots) (Sulova, 2024).
- **Generative AI** refers to models capable of producing new content – texts, code, images, presentations. In higher education, generative systems are used as assistants for drafting assignments, generating examples and designing test items (Bond, 2024; Wang et al., 2024).

Nikolov (2024) stresses that the mathematical foundations of AI – statistics, linear algebra, optimisation and probability theory – are crucial not only for designing AI systems but also for developing students' critical understanding of AI's capabilities and limitations in real-world applications.

### 2.2. Main areas of AI application in higher education

Meta-systematic reviews and large-scale literature surveys identify several dominant areas of AI application in higher education (Bond, 2024; Garzón, 2023; Castillo-Martínez et al., 2024):

- **Intelligent Tutoring Systems (ITS)**, which model students' knowledge, misconceptions and affective states and adapt content and feedback accordingly.
- **Adaptive learning environments**, which adjust the sequence, format and difficulty of learning activities to learner profiles and progress.
- **Learning Analytics**, which uses data about learners' behaviour and performance for early detection of learning difficulties and personalised support.

- **Chatbots and virtual assistants**, which respond to students' questions, support navigation in digital platforms and provide on-demand explanations.
- **Automated assessment**, including grading of quizzes, essays and programming assignments and generation of targeted feedback.
- **Research support systems**, which apply AI for literature discovery, topic modelling and text mining in large digital libraries.

The common trend is a shift from using AI primarily for automation towards using it as a tool for understanding and supporting learning processes in complex, data-rich environments.

## 3. Software Systems for Learner-Centred Educational Services

### 3.1. Learning Management Systems and AI integration

Learning Management Systems (LMS) such as Moodle, Canvas and Blackboard form the backbone of digital learning in many HEIs. Initially designed for content distribution, course management and basic assessment, they are increasingly extended with AI modules (Wang et al., 2024):

- **Recommendation engines** suggest resources based on learners' activity patterns, performance and preferences;
- **Predictive analytics dashboards** identify students at risk and visualise engagement indicators;
- **Integrated chatbots** answer frequently asked questions and support students 24/7;
- **NLP tools** analyse forum posts, essays and short-answer responses to extract themes and detect misconceptions.

Bankov (2023) analyses software solutions for responsive and accessible web systems and argues that the architecture of modern educational platforms must ensure both responsiveness (adapting to different devices) and accessibility (supporting users with diverse needs), while enabling modular integration of AI components for analytics and personalisation.

### 3.2. Adaptive learning platforms

- Adaptive learning platforms extend LMS functionality by constructing explicit **learner models** that capture knowledge, skills, preferred learning strategies and typical errors. Based on these models the system can:
- **propose individual learning paths;**
- **regulate task difficulty;**
- **provide targeted hints and remedial explanations;**
- **generate alternative exercises and representations.**

Empirical studies show that adaptive systems can improve student achievement and satisfaction, particularly in large cohorts with heterogeneous backgrounds (Garzón, 2023; Wang et al., 2024). In courses related to AI and data analysis, adaptive modules may also serve as living examples that demonstrate how AI models operate in practice.

### 3.3. Chatbots, virtual assistants and generative AI

Chatbots and virtual assistants have become widespread in higher education due to their conversational interface and constant availability. They are used to:

- respond to routine administrative and academic queries;
- provide explanations and examples in natural language;
- simulate dialogues in foreign languages or professional communication scenarios.

Generative AI models, often integrated into these assistants, can produce drafts, outlines and alternative formulations on demand. They can help students overcome writer's block, explore multiple perspectives and compare solution strategies (Bond, 2024). However, they also pose challenges related to plagiarism, over-reliance on automatically generated content and potential erosion of critical thinking if used unreflectively.

Consequently, many institutions are developing explicit guidelines on acceptable AI use, emphasising transparency, attribution and the need for human oversight in interpreting AI outputs.

## 4. AI for Students with Disabilities and Digital Accessibility

### 4.1. Assistive technologies and inclusive education

• Inclusive education aims to provide equitable opportunities for all students, including those with disabilities, to participate fully in learning activities. AI-based assistive technologies play a central role in achieving this goal (Fitas, 2025):

• Automatic speech recognition enables live captioning and transcription of lectures, supporting students who are deaf or hard of hearing and improving the usability of video resources.

• Text-to-speech and screen readers allow students with visual impairments or print disabilities to access digital documents and web content.

• Computer vision applications support object and scene recognition, providing verbal descriptions of visual information.

• Adaptive user interfaces dynamically adjust font size, contrast, layout and navigation structure to user preferences and needs.

When integrated into institutional platforms rather than used as ad-hoc individual accommodations, these technologies can transform accessibility into an inherent feature of the digital learning environment.

### 4.2. AI-based mobile applications for digital accessibility

Nacheva (2025) provides a systematic analysis of AI-based mobile applications that can support students with disabilities in higher education, including OCR tools, navigation assistants, voice-controlled apps and task-management systems. She proposes evaluation criteria such as functionality, accessibility, usability, language support and data security, which can guide HEIs in selecting and recommending suitable applications.

Her findings show that while AI can automatically generate or transform text (for instance, by producing summaries or alternative formulations), human editing remains necessary to ensure readability and alignment with learners' needs. In many cases, lengthy or complex paragraphs produced by generic AI tools must be shortened and simplified „without compromising the intended message" (Nacheva, 2025), which underscores the importance of combining AI with pedagogical and accessibility expertise.

In another study, Nacheva (2024) examines digital inclusion practices in AI-mediated hiring processes for people with disabilities, emphasising the need for transparency and fairness. The principles discussed there—clear communication about algorithmic decision-making, accessible user interfaces and opportunities for human appeal—are directly relevant to AI-enhanced educational systems as well.

### 4.3. NLP for accessible e-learning resources

Sulova (2024) explores how NLP technologies can improve the accessibility of e-learning resources. She demonstrates how automatic summarisation, lexical simplification and the insertion of definitions and explanations for specialised terms can help both students with cognitive or linguistic challenges and those unfamiliar with disciplinary jargon.

Embedded in LMS environments or external tools, such NLP functions can:

• generate simplified „easy-to-read" versions of complex texts;

• provide inline definitions and examples;

• adapt text length and complexity to different learner profiles.

These techniques contribute to „universal design for learning", where materials are designed to be accessible from the outset, rather than adapted reactively for specific groups.

### 4.4. Web technologies, interfaces and learner-centred systems

User interface design significantly affects the accessibility and effectiveness of AI-enhanced learning systems. Nikolov (2023) analyses modern technologies for building graphical user interfaces on the web and highlights the advantages of component-based frameworks for creating responsive and accessible educational platforms that integrate AI components and assistive technologies.

Stamenova (2023) proposes an approach for developing a web-based application for human resource management and evaluation in the software industry. Although her work focuses on corporate HR, the principles she formulates—clear user roles, structured workflows, transparent evaluation criteria—are relevant for designing learner-centred systems that track student competences and progress. When augmented with AI for analytics and recommendations, such systems can support personalised feedback, development planning and transition from education to employment.

## 5. Ethical, Legal and Organisational Considerations

### 5.1. Academic integrity and generative AI

The growing use of generative AI by students has triggered intense debates on academic integrity. AI tools can produce coherent essays, problem solutions and program code, making it difficult to distinguish between legitimate assistance and unacceptable outsourcing of work.

Universities are experimenting with diverse responses, including restrictive policies, detection tools and redesign of assessment tasks. A promising direction is an „AI-aware“ approach that:

- requires students to disclose significant use of AI in their work;
- emphasises tasks that demand personal reflection, context-specific analysis and original insights;
- explicitly teaches students how to use AI as a tool for idea generation, exploration and feedback rather than as a substitute for independent thinking.

This approach recognises that AI is likely to remain a standard tool in professional practice and thus should be integrated into higher education in ways that preserve academic standards and foster critical digital literacy.

### 5.2. Data protection and algorithmic fairness

AI-driven Learning Analytics relies on collecting and processing substantial amounts of student data, including grades, activity logs and demographic information. This raises concerns about privacy, consent and algorithmic fairness. Best practices include compliance with data protection regulations (such as GDPR), data minimisation, transparency about data use and regular auditing of models for potential biases (Bond, 2024; Garzón, 2023).

Nacheva’s (2024) analysis of AI in hiring processes for people with disabilities shows how opaque algorithms may reproduce existing inequalities if not carefully examined. Similar risks exist in educational contexts, where biased models could misidentify students as „at risk“ or unfairly limit access to opportunities. Ensuring fairness requires diverse training data, participatory design and mechanisms for human review and appeal.

### 5.3. Organisational policies and competence development

AI adoption in higher education is not purely a technical issue; it is also organisational and cultural. HEIs need to develop clear institutional policies on AI use in teaching, learning and assessment, covering issues such as acceptable use, data governance, accountability and support structures.

Professional development for academic staff is crucial. Lecturers, instructional designers and support staff must understand AI’s capabilities and limitations, be able to interpret analytics outputs and design learning activities that leverage AI without undermining pedagogical goals. At the same time, students should develop AI literacy, including awareness of ethical issues and the ability to critically evaluate AI-generated outputs.

Involving students, including those with disabilities, in the co-design and evaluation of AI-enhanced systems helps ensure that these tools address real needs and do not inadvertently create new barriers.

## 6. Conclusion

AI is reshaping higher education by enabling new forms of personalisation, automation and data-driven decision-making. The main application domains—intelligent tutoring systems, adaptive learning platforms, AI-enhanced LMS, chatbots and assistive technologies—demonstrate that AI can substantially contribute to more learner-centred and inclusive learning environments.

At the same time, AI adoption brings important challenges related to academic integrity, data protection, algorithmic fairness and organisational change. Effective integration requires a balanced approach in which AI complements rather than replaces human teaching and learning, and where ethical, legal and accessibility considerations are embedded into system design from the outset.

The examples discussed in this paper, including AI-based mobile applications for accessibility (Nacheva, 2024; 2025), NLP-enhanced e-learning resources (Sulova, 2024), web technologies for accessible platforms (Bankov, 2023; Nikolov, 2023) and learner-centred systems design (Stamenova, 2023), show that higher education institutions can develop context-sensitive, inclusive and responsible AI solutions.

Future research should investigate the long-term effects of AI on learning outcomes, critical thinking and social justice, as well as develop integrated frameworks for ethical and responsible AI use in higher education that combine technical innovation with pedagogical and institutional transformation.

**References**

1. Bankov, B. (2023). Software Solutions for Responsive and Accessible Web Systems. In Digitalization, Big Data, Artificial Intelligence: Conference Proceedings. University of Economics – Varna.
2. Bond, M. (2024). A meta systematic review of artificial intelligence in higher education: A call for increased ethics, collaboration, and rigour. International Journal of Educational Technology in Higher Education.
3. Castillo-Martínez, I. M., et al. (2024). AI in higher education: A systematic literature review. Frontiers in Education.
4. Fitas, R. (2025). Inclusive education with AI: Supporting special needs and reducing inequalities.
5. Garzón, J. (2023). Artificial Intelligence in Education: A Systematic Review. Multimodal Technologies and Interaction.
6. Holmes, W., Bialik, M., & Fadel, C. (2019). Artificial Intelligence in Education: Promises and Implications for Teaching and Learning. Center for Curriculum Redesign.
7. Luckin, R., Holmes, W., Griffiths, M., & Forcier, L. (2016). Intelligence Unleashed: An Argument for AI in Education. Pearson.
8. Nacheva, R. (2024). Hired by Artificial Intelligence: Digital Inclusion Practices for People with Disabilities. Journal of Underrepresented and Minority Progress, 8(2), 10–41.
9. Nacheva, R. (2025). Analysis of AI Mobile Applications for Ensuring Digital Accessibility in Higher Education for People with Disabilities. Acta Educationis Generalis, 15(1), 133–145.
10. Nikolov, N. (2023). Modern Technologies for Building Graphical User Interfaces on the Internet. HR & Technologies, 2, 90–99.
11. Nikolov, N. (2024). Theoretical Foundations of Artificial Intelligence. In Conferences of the Department of Informatics. University of Economics – Varna.
12. Siemens, G., & Long, P. (2011). Penetrating the Fog: Analytics in Learning and Education. EDUCAUSE Review, 46(5), 30–40.
13. Stamenova, S. (2023). An Approach for Developing a Web-Based Application for Human Resource Management and Evaluation. HR & Technologies, 2, 73–90.
14. Sulova, S. (2024). Application of Natural Language Processing Technologies to Improve Accessibility of E-Learning Resources. In Proceedings of CompSysTech'24.
15. Sulova, S., Bankov, B., & Stoyanova, M. (2024). Web Technologies. Varna: University of Economics – Varna.

**Acknowledgement**

This research was funded by the NPI-65/2023 project "Artificial Intelligence to Help People with Disabilities in Ensuring Digital Accessibility in the Higher Education Learning Process".

ISSN (Online): 2815-5084

INTERNATIONAL SCIENTIFIC AND PRACTICAL CONFERENCE ON HUMAN RESOURCE MANAGEMENT
DOI: 10.56065/HRM/2026.76, pp. 76 – 83

7th edition, 3 October 2025
University of Economics – Varna

# The need to ensure accessibility to educational services for students with special needs

**Slavka STAMENOVA**[1]

[1] University of Economics – Varna (Informatics), University of Economics – Varna, Varna, Bulgaria, slavka.stamenova@ue-varna.bg

**JEL: O14, P24, C41, E13**

**Abstract**

Accessibility in higher education is essential to ensuring equal opportunities for students with special needs, yet many universities continue to face systemic and practical barriers. The purpose of this article is to evaluate the extent of accessibility in university educational services and to propose strategies for improvement. A mixed-methods approach was employed, combining a survey of university faculty members, interviews with students with special needs. A very small proportion of surveyed institutions fully comply with accessibility regulations, while students reported persistent obstacles in digital platforms, classroom environments, and access to specialized support services. Improving accessibility in universities requires not only infrastructural investment but also curriculum adaptation, staff training, and institutional policy reforms. This article integrates student and faculty perspectives with institutional audits, providing a holistic understanding of accessibility challenges in higher education. The findings offer actionable guidance for university leaders and policymakers, emphasizing the need for targeted resource allocation, staff development, and inclusive design practices to advance equitable higher education.

**Published by University of Economics – Varna**

**Key words:**
Higher education, regulations, special needs, specialized support services.

*Citation:* Stamenova, S. (2026). The need to ensure accessibility to educational services for students with special needs. *Proceedings from 7th International Scientific and Practical Conference on Human Resource Management (ICHRM).* University of Economics – Varna, pp. 76 – 83. DOI: 10.56065/HRM/2026.76

## 1. Introduction

Accessibility in higher education is a global priority that intersects with themes of social justice, inclusion and sustainable development. Although equal access to educational services is considered a fundamental principle of contemporary educational ethics, it remains a goal rather than an established reality in many universities (Carballo et al.,2024). While policies declare support for all students – regardless of their abilities or circumstances –a gap exists between theory and practice that reveals systemic barriers to full participation in academic life. Research shows that only a small proportion of higher education institutions fully comply with accessibility standards (Fernández-Batanero et al., 2022). Universities have a dual responsibility: to ensure not only formal access to education (the opportunity to enrol), but also meaningful access – participation in the learning process through adequate support, accommodations and an inclusive environment. In practice, many higher education institutions face systemic and organisational challenges related to physical infrastructure, digital platforms, adapted learning materials, teacher qualifications, and institutional policies (Oswal et al., 2025). In order to monitor the extent to which the educational services provided meet accessibility standards and how they can be improved, this study applies a mixed methodological approach: a quantitative survey among teachers and qualitative interviews with students with SEN. The improvement strategies reported include investments in infrastructure, adaptation of curricula, staff training and institutional reforms. The purpose of this report is to synthesise the key theoretical and empirical research in the field, formulate hypotheses, describe the materials and methods used, present the main results and offer guidance to university management and policymakers.

## 2. Literature Review and Hypotheses Development

### 2.1. Conceptual frameworks and definitions

In the context of higher education, „accessibility“ refers to the ability of students with special educational needs (SEN) to participate equally in all processes of academic life – including enrollment, participation in classes, use of digital resources, taking exams and receiving support services. Accessibility is not limited to physical access, but implies equal opportunities for learning, interaction and academic development.

Barriers to accessibility can be categorized into three main groups:

- organisational – policies, procedures and administrative practices;
- attitudinal – attitudes, stereotypes and social stigma;
- technical/physical – infrastructure, digital platforms, adapted learning materials.

Current trends emphasise the importance of Universal Design for Learning (UDL) and assistive technologies as key tools for creating an inclusive environment. Thus, accessibility should not be seen as an individual adaptation for an individual student, but as an institutional strategy that encompasses curricula, staff qualifications, infrastructure and support services.

### 2.2. Empirical research

Systematic analyses show that students with SEN face significant and persistent barriers in higher education. For example, the review „Access and Participation of Students with Disabilities: The Challenge for Higher Education“ (Fernández-Batanero et al., 2022) highlights the presence of multiple barriers despite formal inclusion policies. Similar conclusions are drawn in the review „Inclusion of Students with Disabilities in the European Higher Education Area“ (Solís-García et al., 2024), which highlights the lack of systematic monitoring and practical implementation of measures. „Assistive Technology for the Inclusion of Students with Disabilities“ (Fernández-Batanero et al., 2022) – demonstrates the positive effects of assistive technologies, but points out that their use remains limited due to insufficient training of teachers, lack of resources and low digital literacy.

The global literature also recognises regional differences in accessibility. Higher education institutions in Northern Europe, the UK and Ireland tend to demonstrate a higher degree of institutional readiness, while countries in Eastern and Southern Europe lag significantly behind (Krejtz et al., 2025). Universities recognise the importance of accessibility, but rarely conduct systematic assessments of compliance (Todoranova and Penchev, 2023).

The most common barriers for students with SEN include:

- digital accessibility;
- physical infrastructure;
- staff training gaps;
- negative attitudes;
- lack of adapted learning resources and support services.

European comparisons (European Agency for Special Needs and Inclusive Education, 2025) show that Bulgaria lags behind Western and Northern Europe in terms of institutional capacity and staff qualifications. The professional development of teachers is cited as a key factor for inclusion (Fig. 1).

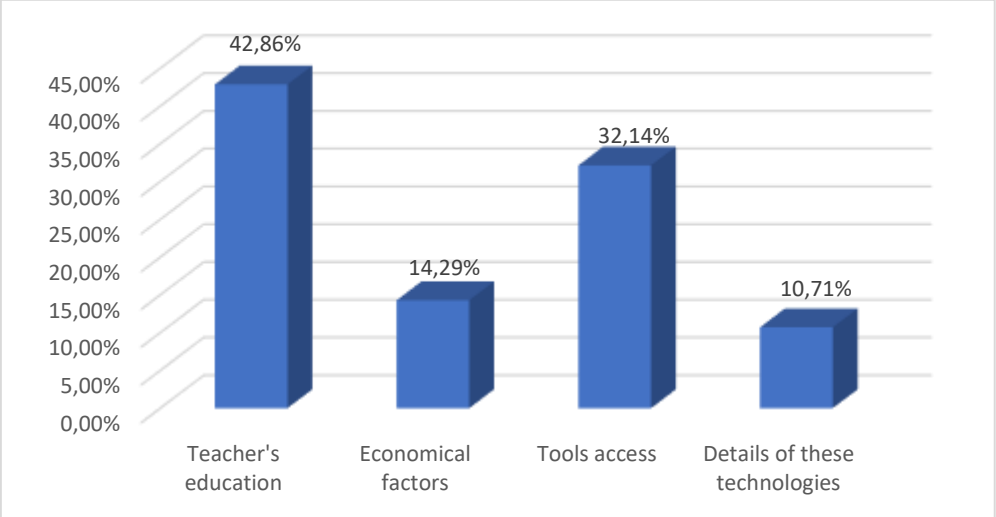



**Fig. 1. Difficulties in the use of assistive technology**

*Source:Fernández Batanero et al.,2022*

Numerous studies argue that the lack of teacher training (42.86%) in the field of accessibility is one of the most serious barriers to the practical implementation of inclusive policies (*Fernández Batanero et al., 2022*), as well as the difficulties of access to *assistive technology tools* (32.14%).

### 2.3. Formulated hypotheses

Based on theoretical and empirical research, the following hypotheses are formulated:

**H1**: A small proportion of higher education institutions achieve full compliance with architectural and digital accessibility standards.

**H2**: Students with SEN more often encounter institutional and pedagogical barriers than purely physical ones.

**H3**: Bulgaria lags behind European standards in terms of institutional readiness and staff qualifications.

**H4**: Systematic institutional support and faculty training correlate positively with the satisfaction and academic engagement of students with SEN.

The formulated hypotheses outline the key areas in which the study aims to identify structural deficits and potential solutions for increasing accessibility in higher education.

3. Material and Methods

The comprehensive assessment of accessibility in higher education requires a mixed-methods approach integrating quantitative compliance audits with qualitative perspectives from key stakeholders (*Bong and Chen, 2021*). This methodology provides both empirical data on accessibility standards compliance and a rich contextual understanding of lived experiences.

Data collection methods include quantitative and qualitative components.

***Quantitative components:***

- automated and manual website accessibility audits using established standards (WCAG 2.1, Web Content Accessibility Guidelines);
- analysis of institutional policies and procedures related to accessibility;
- survey data from faculty, staff, and students regarding accessibility awareness and implementation;
- institutional data on support services utilisation and student outcomes.

***Qualitative components:***

- semi-structured interviews with students with disabilities regarding their experiences accessing educational services;
- focus groups with faculty members regarding barriers and facilitators to inclusive teaching;
- interviews with disability services professionals about resource constraints and service gaps;

- document analysis of institutional accessibility plans, policies, and procedures.

Representative sampling across multiple institutional types (large research universities, regional comprehensive universities, community colleges), geographic regions, and student populations ensures a comprehensive understanding of accessibility challenges and promising practices across diverse contexts.

## 3. Theoretical Framework

### Universal Design for Learning (UDL)

The Universal Design for Learning framework provides a foundational theoretical approach for conceptualizing accessibility in higher education (Black et al., 2015). UDL principles emphasise providing:

- multiple means of representation – presenting information in varied formats to accommodate diverse learning preferences (Moria et al., 2025);
- multiple means of action and expression – offering students varied ways to demonstrate learning;
- multiple means of engagement – providing options that sustain motivation and engagement;

This framework moves beyond accommodation (adapting education after the fact for individuals with disabilities) to universal design (building flexibility and accessibility into core instructional design) (Timu et al., 2023).

### Social Model of Disability

Understanding the social model of disability—which locates disability not within individuals but within social and physical environments that fail to accommodate human diversity—is essential for reframing accessibility challenges (Ireri et al., 2020). Rather than asking „What is wrong with the student?“ the social model prompts institutions to ask „What is wrong with our systems, policies, and environments?“ This reframing shifts responsibility from individuals to institutions and encourages systemic change.

### Intersectionality and Equity Theory

Contemporary equity frameworks recognize that students experience multiple, overlapping forms of marginalization (Timu et al.,2023). Intersectional analysis examines how disability intersects with race, gender, socioeconomic status, language, and other identities to create distinct barriers and opportunities. Educational equity requires attention to these intersecting dimensions rather than treating disability or other characteristics in isolation.

### Stakeholder Engagement Models

Effective institutional change requires meaningful engagement of all stakeholders—students with disabilities, faculty, administrators, support staff, and community partners (Moppes et al., 2024). Participatory action research and deliberative dialogue approaches ensure that solutions reflect a genuine understanding of needs and constraints across perspectives.

## 4. Findings and discussion

Institutional Compliance Gaps – Research consistently reveals that most surveyed higher education institutions demonstrate significant gaps between accessibility policies and actual implementation (Laamanen et al., 2022). Analysis of institutional websites, learning management systems, and accessibility infrastructure shows widespread non-compliance with established standards. Financial constraints, limited technical expertise, and competing institutional priorities contribute to these gaps (Fowler, 2024).

Faculty Knowledge and Readiness – Studies examining faculty readiness for inclusive teaching reveal substantial variations in knowledge, attitudes, and practices. While many faculty express willingness to implement inclusive approaches, they often lack specific training and resources (Lopatina et al., 2023). Effective professional development must address both knowledge gaps (understanding disability, accessibility laws, and inclusive design principles) and attitudinal barriers (unconscious bias, low expectations for students with disabilities).

Student Experiences and Outcomes – Qualitative research capturing student perspectives reveals both significant progress and persistent barriers. Students with disabilities report that while universities have made efforts toward accessibility, they frequently encounter obstacles requiring self-advocacy and workarounds

(Zaki and Ismail, 2021). Notable findings include:

- students must often take extra steps to access basic accommodations available in theory but not readily provided in practice;
- invisible disabilities receive less institutional recognition and support than visible disabilities;
- digital platforms and online learning, while offering potential accessibility benefits, create new barriers when not properly designed;
- student mental health and sense of belonging are significantly affected by accessibility experiences.

In order to assess the validity of the previously formulated hypotheses and their correspondence with the obtained empirical results, the results are systematized in Table 1. The table presents a summary of the main hypotheses, the degree of their confirmation and interpretation of the most significant observations arising from the analysis of the qualitative and quantitative data (Table 1).

**Table 1**

**Hypotheses and results of the study**

| № | Hypothesis | Result | Confirmation of a hypothesis |
|---|---|---|---|
| H1 | A small proportion of higher education institutions achieve full compliance with architectural and digital accessibility standards. | Analysis of institutional websites and platforms shows significant gaps in compliance with WCAG 2.1 and a lack of systematic monitoring. | **Confirmed** |
| H2 | Students with SEN more often encounter institutional and pedagogical barriers than purely physical ones. | Interviews reveal problems with service administration, access to adapted materials, and uneven teaching support. | **Confirmed** |
| H3 | Bulgaria lags behind European standards in terms of institutional readiness and staff qualifications. | Data from comparative studies and a literature review show a clear lag compared to Northern and Western Europe, especially in teacher training. | **Confirmed** |
| H4 | Systematic institutional support and faculty training correlate positively with the satisfaction and academic engagement of students with SEN. | Correlational trends are observed in the literature and partially in the interviews – additional quantitative data are needed for statistical validation. | **Partially confirmed** |

*Source: Author's Compilation, 2025.*

The results presented can serve as a basis for an in-depth discussion on the practical and institutional dimensions of accessibility in higher education. Furthermore, the table outlines a potential framework for future quantitative research to validate the statistically observed relationships – for example, by measuring correlations between institutional support, student satisfaction and academic performance.

### 5. Recommendations for improvement

Based on a comprehensive analysis of research evidence and promising practices, several key recommendations emerge for universities seeking to enhance educational accessibility:

**Infrastructure and Technology Investment –** universities must prioritise investment in accessible physical environments, digital platforms, and assistive technologies (Broering, 2024). This includes:

- website remediation to achieve WCAG 2.1 AA compliance;
- accessible learning management systems with built-in universal design principles;
- provision of assistive technology for students with visual, hearing, and mobility impairments;
- continuous monitoring and improvement of accessibility infrastructure.

Curriculum and Pedagogical Transformation – integrating Universal Design for Learning principles into course design, instructional methods, and assessment approaches can benefit all students while specifically

supporting those with disabilities (Karim. 2024). This requires curriculum reform that considers diverse learning needs in initial design rather than attempting accommodations after instruction has been planned (Ranbir, 2024).

Faculty Development and Support – comprehensive, ongoing professional development is essential for building faculty capacity to implement inclusive teaching (Cotta et al., 2024). Effective faculty development should:

- address both knowledge (what to do) and attitudes (why it matters);
- provide practical training in specific accessibility techniques and technologies;
- recognize and reward inclusive teaching through promotion and tenure processes;
- create communities of practice where faculty can share experiences and learn from colleagues.

Comprehensive Support Services – accessible support services require adequate staffing, training, and resources (Broskowski et al., 2025). Services should extend beyond accommodations to encompass:

- academic coaching and tutoring with accessibility integrated from the start;
- mental health and counselling services trained in disability-related issues;
- career development specifically addressing employment barriers for people with disabilities;
- peer support networks connecting students with similar disabilities or experiences.

**Institutional Policy and Governance** Reform – effective accessibility requires formal policies, clear procedures, adequate funding, and accountability mechanisms (Moppes et al., 2024). This includes:

- Written institutional accessibility plans with specific, measurable goals and timelines
- Clear procedures for requesting and receiving accommodations
- Accessible grievance processes for students facing discrimination or accessibility barriers
- Regular institutional audits and public reporting of accessibility metrics

**Student and** Community Partnership – students with disabilities and disability advocacy organizations should be authentic partners in accessibility improvement efforts rather than merely consulted (Mohammad and Aldakhil, 2024). Participatory approaches that genuinely elevate student voices in decision-making produce more effective, relevant solutions.

## Conclusion

Ensuring access to educational services for students with special educational needs (SEN) is a critical aspect of modern higher education, affecting not only the individual prospects of students, but also the societal goal of equal opportunities and social justice. Despite the existence of policies and individual good practices, a significant part of universities has not yet achieved compatibility with access requirements, which limits the participation of students in academic life.

The results of the conducted research emphasize that sustainable progress requires an integrated, systematic approach, including improvements in physical and digital infrastructure, development of a welcoming academic culture, professional development and training of staff, provision of adequate resources and assistive technologies, participation of students in the decision-making process, accountability and transparency in institutional policies.

The transition to a welcoming environment and adequate resource provision and adaptive learning is a strategic necessity for any institution striving for quality and innovation in the preparation not only of students with special needs, but also of all other students (Onesi-Ozigagun, 2024).

## Acknowledgement

This research was funded by the NPI-65/2023 project "Artificial Intelligence to Help People with Disabilities in Ensuring Digital Accessibility in the Higher Education Learning Process".

## References

1. Black, R. D., Weinberg, L. A., & Brodwin, M. G. (2015). Universal design for learning and instruction: Perspectives of students with disabilities in higher education. https://doi.org/10.5206/eei.v25i2.7723

2. Bong, W. K., & Chen, W. (2021). Increasing faculty's competence in digital accessibility for inclusive education. https://doi.org/10.1080/13603116.2021.1937344

3. Broering, G., & Broering, S. L. E. (2024). Legal aspects in the construction of inclusive education: Strategies to ensure equity and accessibility. 10.56238/arev6n3-143

4. Broskowski, E., Triano, S., James, K., Betchkal, R., Echols, K. L. T., Hawks, S., Ogah, O., Nguyen, M., & Meeks, L. M. (2025). The role, challenges, and employment characteristics of disability resource professionals in medical education. https://doi.org/10.1177/23821205251344771

5. Carballo, R., Moria, A., & Castellano-Beltran, A. (2024). Learning from faculty members who carry out inclusive pedagogy in Spanish universities. https://doi.org/10.53761/ab2y2h09

6. Cotta, R. M., Ferreira, E. S., Franco, F. A., Barros, G. C. S., Janurio, J. P. T., Moreira, T. R., & Martn, R. L. (2024). The effectiveness of faculty development programs for training university professors in the health area. https://doi.org/10.1186/s12909-024-05735-1

7. European Agency for Special Needs and Inclusive Education (2025). Inclusion of students with disabilities in the European Higher Education Area: comparative analysis. Available at: https://www.european-agency.org/. (Accessed: 21 November 2025).

8. Fernández Batanero, José & Montenegro-Rueda, Marta & Fernández Cerero, José & García-Martínez, Inmaculada. (2022). Assistive technology for the inclusion of students with disabilities: a systematic review. Educational technology research and development. 70. 1-20. 10.1007/s11423-022-10127-7

9. Fernández-Batanero, J. M., Montenegro-Rueda, M., & Fernández-Cerero, J. (2022). Access and Participation of Students with Disabilities: The Challenge for Higher Education. *International Journal of Environmental Research and Public Health*, 19(19), 11918. DOI:10.3390/ijerph191911918.

10.Fowler, B. (2024). Cybersecurity leadership policy and compliance for institutions of higher education. 10.30574/wjaets.2024.12.2.0331

11. Ireri, R. B., Madrine, K., Eric, W., & Simon, T. (2020). Policy strategies for effective implementation of inclusive education in Kenya. https://doi.org/10.5897/ijeaps2019.0622

12. Karim, F. (2024). Curriculum design for inclusive education: Integrating universal design for learning in teacher preparation. 10.33545/30810647.2024.v1.i1.a.3

13. Krejtz, K., Marcus-Quinn, A., Duarte, C., Stasiak, I., Seixas Pereira, L., & Krejtz, I. (2025). Higher education accessibility information in practice: A report on the accessibility of European universities. https://doi.org/10.1007/s10209-025-01224-4

14. Laamanen, M., Ladonlahti, T., Puupponen, H.-H., & Krkkinen, T. (2022). Does the law matter? An empirical study on the accessibility of Finnish higher education institutions web pages. https://doi.org/10.1007/s10209-022-00931-6

15. Lopatina, H., Tsybuliak, N., Popova, A., Hurenko, O., & Suchikova, Y. (2023). Inclusive education in higher education institution: Are Ukrainian faculty members ready for it? https://doi.org/10.1177/00345237231207721

16. Mohammad, W. S., & Aldakhil, A. F. (2024). Promoting inclusive learning environments: Leveraging university websites for digital empowerment in the post-COVID-19 era. https://doi.org/10.3390/healthcare12121212

17. Moppes, N. M., Nasori, M., Bont, J., van Es, J. M., Visser, M. R. M., & van den Muijsenbergh, M. (2024). Towards inclusive learning environments in post-graduate medical education. https://doi.org/10.1186/s12909-024-05521-z

18. Moria, A., Carballo, R., & Domnech, A. (2025). Transforming higher education: A systematic review of faculty training in UDL and its benefits. https://doi.org/10.1080/13562517.2025.2465994

19. Onesi-Ozigagun, O., Ololade, Y. J., Eyo-Udo, N. L., & Ogundipe, D. O. (2024). Revolutionizing education through AI: A comprehensive review of enhancing learning experiences. https://doi.org/10.51594/ijarss.v6i4.1011

20. Oswal, N., Al-Kilani, M. H., Faisal, R., & Fteiha, M. (2025). A systematic review of inclusive education strategies for students of determination in higher education institutions. https://doi.org/10.3390/educsci15050518

21. Ranbir. (2024). Inclusive education practices for students with diverse needs. 10.36676/irt.v10.i1.1405

22. Solís-García, P. *et al.* (2024) 'Inclusion of students with disabilities in the European Higher Education Area (EHEA): a systematic review', *Cogent Education*, 12(1). doi: 10.1080/2331186X.2024.2430880.

23. Timu, N., Bartlett, M. E., Bartlett, J. E., Ehrlich, S., & Babutsidze, Z. (2023). Fostering inclusive higher education through universal design for learning and inclusive pedagogy. https://doi.org/10.1080/07294360.2023.2234314

24. Todoranova, L., Penchev, B. (2023) Vissheto obrazovanie – dostapno za horata s uvrezhdania. Spisanie „Choveshki resursi & Tehnologii = HR &Technologies", Sdruzhenie „Kreativno prostranstvo", 2, pp. 45 – 56.

25. Zaki, N. H. M., & Ismail, Z. (2021). Towards inclusive education for special need students in higher education from the perspective of faculty members: A systematic literature review. https://doi.org/10.24191/ajue.v17i4.16189

ISSN (Online): 2815-5084

INTERNATIONAL SCIENTIFIC AND PRACTICAL CONFERENCE ON HUMAN RESOURCE MANAGEMENT
DOI: 10.56065/HRM/2026.84, pp. 84 – 92

7th edition, 3 October 2025
University of Economics-Varna

# Offboarding- Information security, ethics, loyalty

**Silviya NIKOLOVA**

[1] Technical university of Varna, Bulgaria, Social and Legal Science, PhD Student, sunny_tulip@abv.bg

**JEL: O15, E24, J24, A13**

**Abstract**

This paper investigates offboarding practices in remote work settings, with a particular focus on security, ethics, and loyalty. It explores how organizations adapt offboarding processes to virtual environments, including the challenges of information protection, technological access termination, and the implications of Bring Your Own Device (BYOD) policies. The study further examines ethical aspects of documentation, the provision of experience letters and references, and the importance of transparent communication. Philosophical and practical dimensions of employee loyalty are analyzed alongside practices such as garden leave, alumni programs, exit interviews, and structured knowledge transfer. By integrating these perspectives, the paper highlights how properly managed remote offboarding safeguards organizational data, supports ethical standards, and fosters sustainable employer–employee relationships. Practical recommendations are offered for designing secure, ethical, and loyalty-oriented offboarding policies in contemporary organizations.

**Key words:** Offboarding, information security, BYOD, transfer knowledge, ethics, loyalty.

**Published by University of Economics – Varna**

*Citation:* Nikolova, S. (2026) Offboarding – information security, ethics, loyalty. *Proceedings from 7th International Scientific and Practical Conference on Human Resource Management (ICHRM).* University of Economics-Varna, pp. 84 – 92. DOI: 10.56065/HRM/2026.84

## 1. Introduction

The termination of employment relations has always posed a significant challenge not only for human resource departments, but also for individual teams and, more broadly, for business organizations. This challenge arises from the necessity to conclude and summarize certain operational processes with respect, integrity, and professionalism. Offboarding has acquired particular importance in the era of remote work, as it introduces new models and approaches to organizational practice. The relevance of the topic lies precisely here – in the question of how a company can ensure effective remote offboarding of employees while safeguarding information security, upholding ethical standards, and preserving mutual loyalty. The primary aim of this paper is to outline the key practices and potential risks associated with contemporary offboarding processes.

The main research objectives of this study are as follows:

- To analyze the specific challenges of employment termination in the context of remote work.
- To identify risks related to information security in remote offboarding, including access termination, BYOD policies, and data protection.
- To examine the ethical dimensions of the process, including documentation, the provision of references, and the fair treatment of employees.

To explore the concept of loyalty in both organizational and philosophical contexts, as well as its practical implications for offboarding.

## 2. Literature Review and Hypotheses Development

### 2.1. Definition of Offboarding

**Table 1**

**Definitions of offboarding process**

| Definition | Author, publication, year |
|---|---|
| Employee exit management describes the consciously designed separation process when an employee leaves the company, for which he has previously worked within the scope of a work or service contract. It deals with the formal processes revolving around an employee's exit from an organization either through voluntary resignation, layoffs or termination. | An Empirical Study on Employee Exit Management Practices in Software Industries", International Journal of Engineering & Technology, Kiran Kumar Thoti & Roselina Ahmad Saufi, 2018 |
| Offboarding refers to the process of managing an employee's departure from a company in a structured and organized manner. | Crail, C (2022). Offboarding: Definition & Best Practices. Forbes, Retrieved from: https://www.forbes.com/advisor/business/offboarding/ |

*Source: Author's synthesis of the data*

In both international and Bulgarian academic publications, there is a noticeable lack of clear and consistent definitions of the term "offboarding." The term is often associated with employee exit management as a process aimed at the organized and controlled termination of employment relationships. Within the scope of this report, existing definitions will be reviewed, and a tailored interpretation will be proposed, adapted to the specificities of the digital era. The proposed definition of offboarding describes a process in which, regardless of whether the employee performs duties on-site or remotely, strict compliance with all legal and corporate regulations related to the termination of employment is ensured. The process encompasses all necessary measures to restrict internal access and employee privileges, thereby safeguarding the organization's information and resources.

Offboarding is a human resource management process that includes all steps and actions related to an employee's departure, undertaken by the organization, whether due to resignation, retirement, or dismissal. The process aims to ensure a smooth transition while preserving goodwill between the organization and the employee, and it structures knowledge transfer and feedback. In the context of the digital era, offboarding also incorporates specific information security measures, such as monitoring and restricting access to internal systems, resources, and organizational data. Regardless of whether the employee works on-site or remotely, the process guarantees adherence to all legal and corporate regulations associated with employment termination.

Successful offboarding requires synchronization between HR, IT, and management, as well as a thorough understanding of the organization's operational processes. Information security is particularly critical—controlling access, protecting sensitive data, and archiving corporate information. The strictness of procedures should correspond to the sensitivity of the data the employee has handled.

Operational processes related to onboarding and offboarding in a company reflect management's readiness to handle changes. If onboarding occurs at the entrance and offboarding at the exit of the organization, this can serve as a metaphorical framework for the company's lifecycle. Although differing in purpose and temporal positioning, both processes are strategic elements of human resource management, influencing organizational culture, employer reputation, and the long-term sustainability of employment relationships.

### 2.2. Remote Work and the Modification of Offboarding as a process

Remote forms of work require a special approach to the termination of employment relationships. The modification of offboarding arises, on the one hand, from technological developments, and on the

other, from the specific work arrangements. One of the key aspects of offboarding for business organizations is information security. Technical measures typically include restricting access, which involves the timely deactivation of VPN accounts, corporate emails, and cloud accounts to prevent data leakage.

A widely adopted practice in operational processes is the use of centralized checklists, which provide steps to ensure that no access points are overlooked. Automation in relation to information security is associated with the implementation of Identity and Access Management (IAM) systems, which automatically synchronize and terminate permissions across various platforms. This reduces human errors and accelerates the process. (Cascio, W. F., & Boudreau, J. W.,2016)

The modification of offboarding also brings with it new best practices aimed at facilitating the process, enhancing security, and upholding ethical and moral principles. One of the first practices is online equipment return, rather than requiring the employee to visit the office in person. In remote work contexts, this is often impossible due to long distances. Organizations can arrange courier services or local drop-off points for the return of company devices (laptops, phones, access cards, etc.). Tracking systems and pre-agreed protocols are often used to verify the condition of returned equipment.

Electronic signatures allow documents related to employee departure—such as employment contracts, confidentiality agreements, and knowledge transfer documents—to be signed without physical presence. They ensure legal validity, accelerate the process, and facilitate archiving, but they require reliable identification systems and protection against forgery.

BYOD (Bring Your Own Device)

When employees use their own devices for work, the risks associated with offboarding are significant. Mechanisms must be in place to erase corporate data from personal devices (through Mobile Device Management solutions or specialized software). Policies should clearly distinguish between work and personal environments to avoid excessive intrusion into personal data. At the time of hiring, it is important to have a signed agreement regarding the use of personal devices, which regulates the rights and responsibilities of both parties.

Another crucial principle embedded in HR procedures is the criticality of data—the sensitivity of the information handled by the employee. This includes whether the employee communicates with clients, manages contractual or financial data, payroll information, or has access to key systems. When the level of data sensitivity is high, offboarding is conducted under strict supervision by security specialists, with additional steps taken to protect the information, such as archiving and other safeguards. The attached questionnaire (**Attachment 1**) demonstrates how access is terminated depending on the employee's role, the sensitivity of the information, and how it will be used by a potential replacement. This questionnaire is an integral part of the company's offboarding procedure, the significance of which will be discussed in the following sections.

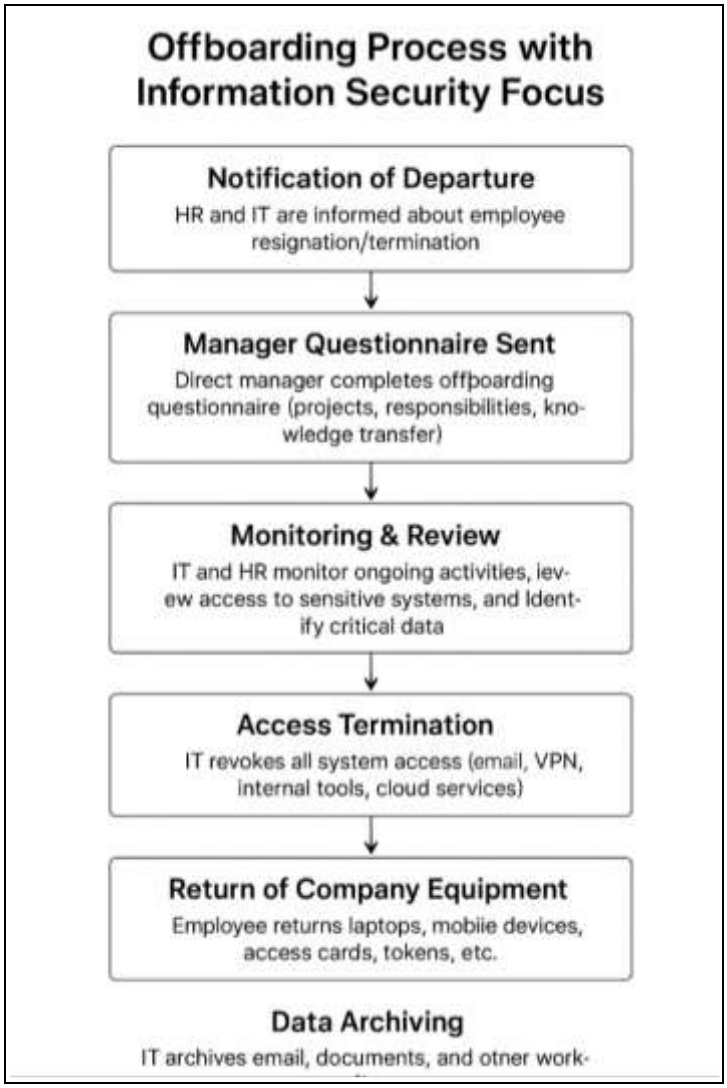



**Figure 1. Offboarding Process with information security focus.**

*Source: Authors' Compilation, 2025*

A moment that must never be underestimated is the ethical and moral aspect of managing employee departures. In offboarding, it is essential to ensure transparency, honesty towards the employee, respect for their dignity, and the right to make choices. In many cases, companies limit themselves to complying with labor laws and regulations, although there are instances where organizations completely disregard such legislation. However, the treatment of the employee after their departure or termination should not change. They should continue to receive the same benefits during the notice period and enjoy the same social entitlements as other employees.

During the notice period, the departing or terminated employee should not be isolated from the work process. On the contrary, they should be engaged equally with other team members to ensure a smoother knowledge transfer. This is a critically important process that preserves organizational memory and minimizes the risk of operational disruptions. When a key employee leaves, there is a significant risk of "knowledge loss," which can delay projects, disrupt client relationships, and complicate internal processes.

Effective knowledge transfer involves a combination of methods, including structured documentation of procedures and materials, conducting internal trainings and demonstrations, creating manuals, and implementing a shadowing period in which the successor observes and follows the departing employee. Coordination of this process is the responsibility of both the HR department and the line manager, who monitor deadlines, the completeness of transferred information, and its clear organization.

From a technological perspective, the IT team manages the transfer and protection of electronic data:

archiving corporate emails, transferring necessary contacts, providing access to shared documents, migrating files from local and cloud storage, and then closing/deactivating accounts to ensure security and compliance with data protection policies. Physical documents are transferred according to administrative procedures and archived following internal rules.

In the absence of a systematic knowledge transfer, the organization may face long onboarding periods for new employees, redundant process re-invention, errors, disrupted communication, and reduced efficiency—issues that can be prevented through a well-coordinated and structurally maintained offboarding process.

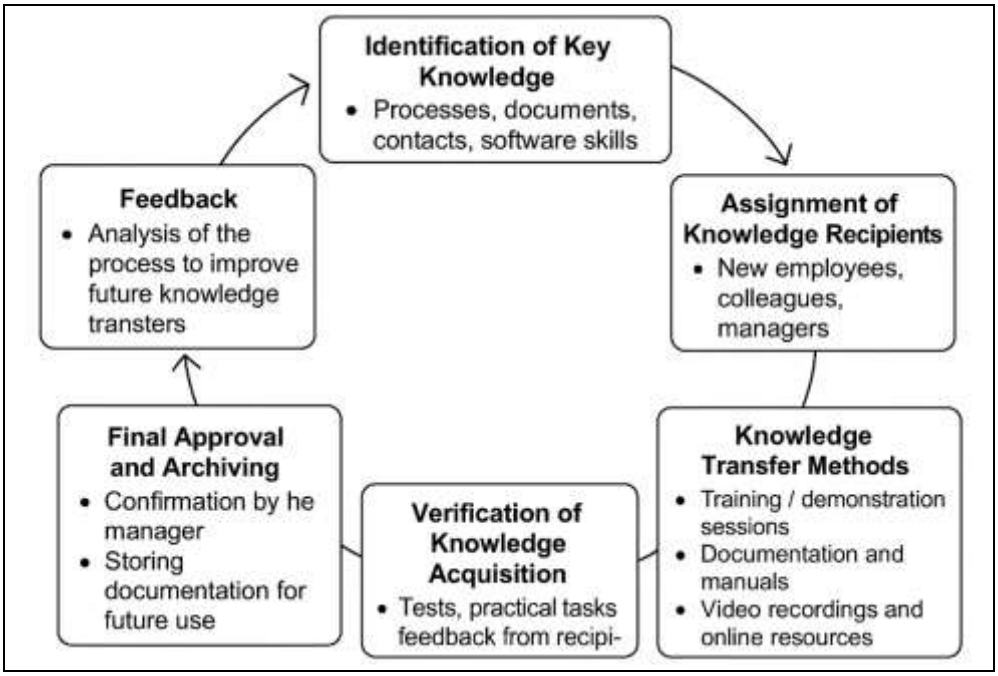



**Fig.2 Knowledge transfer process**

*Source: Authors' Compilation, 2025*

In the contemporary environment, human resource management is entering a new phase, where the philosophy of relationships and corporate security intertwine, and ethical offboarding becomes not only a moral choice but also a strategic competitive advantage. Beyond the administrative aspects of employee departure, a key element is emotional offboarding, which considers the psychological impact on the departing employee, their colleagues, and team dynamics. The offboarding process is often emotionally charged: even highly skilled employees who choose to advance their careers for better compensation or new opportunities may experience sadness, nostalgia, and attachment to the team with which they have built stable and supportive relationships. These emotions can also affect colleagues, who may feel uncertainty, a sense of loss, or decreased team morale.

Ethical and psychologically considerate offboarding minimizes these negative effects, maintains a positive organizational culture, and strengthens employer reputation, while facilitating adaptation to change—for both the departing employee and the organization, which must restructure operationally and emotionally. As a result, this approach ensures the sustainability of relationships, fosters higher trust, and enhances companies' ability to attract and retain talent in a dynamic labor market.

Within modern HR practices, the concept of celebration in offboarding is becoming increasingly prominent—a positive recognition ritual during departure that treats the end of the employment relationship as a natural and valuable stage of the employee lifecycle. Such symbolic acknowledgments—thank-you meetings, brief celebrations, personalized messages, or team gatherings—help preserve organizational culture and reduce the psychological stress associated with change for both the departing employee and their colleagues. They provide an opportunity to "close the loop," reinforce a sense of fairness and belonging, and

support a positive emotional atmosphere within the team.

From a strategic perspective, these practices strengthen employer branding, reduce the risk of negative interpretations of the offboarding process, and create a foundation for future relationships within alumni networks and potential boomerang hires. In this way, celebration in offboarding becomes an essential element of an ethical and holistic approach to human capital management in modern organizations.

This can be complemented by an "Experience Letter"- an official document certifying the employee's period of employment, held position, and primary responsibilities, which is widely recognized internationally—as well as a "Reference Letter," which helps build a positive professional image and facilitates future career development. Preparing a reference requires carefully balancing honesty towards the prospective employer with professional ethics toward the departing employee. Best practices include describing strengths, achievements, and specific competencies, while avoiding subjective or negative assessments that could harm the employee. Instead of criticism, it is ethical to use neutral language and focus on factual elements—such as position, responsibilities, project involvement, and professional conduct. It is unethical to provide false information or conceal serious risks, but it is equally unethical to include negative opinions if they are not officially documented as part of the employee's work performance. Providing a reference is permissible only with the informed consent of the employee, as it involves processing and sharing personal data—name, position, employment period, performance information, and competencies. The organization should document this consent and ensure that the information included in the reference is limited to what is necessary for the stated purpose. Sharing sensitive data or internal evaluations without legal basis is strictly prohibited.

Another important aspect that combines loyalty and post-offboarding responsibilities is the background check. When conducting a background check, the former employer has the responsibility to provide information that is accurate, objective, and relevant to the new employer, while complying with legal, ethical, and organizational frameworks for data protection. Typically, employment-related data is shared – position, employment period, main responsibilities, and achievements – without disclosing personal or sensitive aspects unrelated to professional qualifications. Providing such information accurately and in a balanced manner demonstrates professionalism and gratitude toward the former employee, while maintaining the organization's positive image and facilitating the employee's successful integration into the new work environment.

Loyalty and ethics in employee departure are not merely administrative categories, but philosophical dimensions of the relationship between the individual and the organization. They raise the question of trust—the invisible capital that sustains the social fabric of any community. An employee's departure is not only the end of a contract but also a symbolic act that sends a message: whether the organization is a place where people are respected even in their final moments of presence.

In the traditional industrial model, loyalty was often understood as one-sided – the employee was "obliged" to be loyal to the employer. In the post-industrial and digital era, this model has changed: loyalty becomes reciprocal and ethical based on mutual recognition, transparency, and fairness. The ethics of separation is no longer a secondary detail but a critical test of the maturity of organizational culture.

The modern economy, built on mobility, project-based employment, and high competition for talent, makes offboarding a key component of strategic human capital management. It represents a transition from a reactive to a proactive HR model – a process that preserves knowledge, protects security, and strengthens organizational reputation.

## 3. Conclusion

The analysis of offboarding in contemporary organizations highlights its evolution from a purely administrative procedure to a strategic, ethical, and holistic component of human resource management. The process encompasses not only formal compliance with labor laws and organizational regulations but also the protection of information security, knowledge transfer, emotional well-being, and corporate reputation. The main insights are:

- Strategic Value of Offboarding: Offboarding is no longer simply an exit process; it is a mechanism to preserve organizational memory, ensure operational continuity, and maintain positive relationships with

departing employees, which can influence employer branding and talent retention.

- Transparency, respect, and fairness are critical. Ethical offboarding, combined with emotional support, mitigates negative impacts on both departing employees and remaining staff, sustaining organizational culture and trust.
- The digital era necessitates modifications to traditional offboarding practices. Automated systems for access management, secure return of equipment, and online documentation enhance security and reduce human error.
- Knowledge Transfer and Retention: Structured procedures for knowledge transfer—through documentation, shadowing, and training—are essential to prevent operational disruptions and maintain business continuity.

**References**

1. Crail, C. (2022). Offboarding: Definition & Best Practices. Forbes. https://www.forbes.com/advisor/business/offboarding/

2. Cascio, W. F., & Boudreau, J. W. (2016). *The search for global competence: From international HR to talent management.* Journal of World Business, 51(1), 103–114. https://doi.org/10.1016/j.jwb.2015.10.002

3. Dessler, G. (2020). *Human Resource Management* (16th ed.). Pearson.

4. Kiran Kumar Thoti, & Roselina Ahmad Saufi. (2018). An empirical study on employee exit management practices in software industries. *International Journal of Engineering & Technology*, 7(4), 321–329. https://doi.org/10.14419/ijet.v7i4.1.23456

5. Society for Human Resource Management (SHRM). (2021). *Employee offboarding: Policies, procedures, and best practices.* https://www.shrm.org/resourcesandtools/hr-topics/organizational-and-employee-development/pages/offboarding.aspx

## Attachment 1

### Resignation questionnaire

| Resignation Quistionnaire | | |
|---|---|---|
| **Classification** | Internal Use | |
| **Reporter Information (Direct Manager Details)** | | |
| **Manager's name** | | |
| **Department** | | |
| **Resigned/ End-of-contract Information details** | | |
| **Name** | | |
| **Last Position** | | |
| **Resignation Date (dd/mm/yyyy)** | | |
| **Last Working Day Date (dd/mm/yyyy)** | | |
| **Used Systems** | | |
| **Please remark the used system by the resigned/ end-of-contracted enduser** | System name | Yes/No |
| | Local AD access | |
| | Microsoft 365/ Google account | |
| | 3CX PBX | |
| | Salesforce / Sharepoint | |
| | Jira | |
| | Confluence | |
| **If there is any extra used system please put it in this section** | | |
| **Information About the Job of the resigned/end-of-conrtacted employee** | | |
| **What is the criticality of the handled data by the resigned/ end-of-contracted employee? (1 (least critical) to 5 (highest critical))** | | |
| **Is in his/her job responsibilities include communicating with customers? (yes/N0)** | | |
| **Is in his/her job responsibilities include communicating with third parties such as supliers or contractors ? (yes/N0)** | | |
| **The successor employee details** | | |
| **Employee Name** | | |
| **Employee Position** | | |
| **Accounts Handling** | | |

| | | |
|---|---|---|
| **please select the needed action to be done by the IT department or the direct manager** | please select the needed action for the mailbox. | |
| | please select the needed action for the stored files on the endpoints | |

*Source: The questionnaire is part of The Offboarding Procedure at Finhub EAD.*

ISSN (Online): 2815-5084

INTERNATIONAL SCIENTIFIC AND PRACTICAL CONFERENCE ON HUMAN RESOURCE MANAGEMENT
DOI: 10.56065/HRM/2026.93, pp. 93 – 105

7th edition, 3 October 2025
University of Economics-Varna

# Artificial intelligence in human resources management software

**Branislava YOVICH**[1]

[1] Human Resources and Social politics (Department), UNWE, Sofia, Bulgaria, branislava.yovich@unwe.bg

**JEL: O14, P24, C41, E13**

**Key words:**
AI in HR, artificial intelligence, automation, human resources, HR software, cultural resistance, ethics, predictive analytics, virtual assistants.

**Abstract**

The article examines the impact of artificial intelligence (AI) on human resource management (HR), focusing on improvements in efficiency, automation and personalization of HR processes. The research used a qualitative approach, including a literature review and empirical analysis of specific cases from different regions. Benefits such as selection optimization, increased engagement and reduced bias were identified, as well as challenges such as cultural resistance, lack of skills and ethical issues. The article recommends a strategic approach to implementing AI to ensure sustainable development and maximize benefits for organizations.

**Published by University of Economics – Varna**

*Citation:* Yovich B. (2025). Artificial intelligence in human resources management software. *Proceedings from 7th International Scientific and Practical Conference on Human Resource Management (ICHRM).* University of Economics – Varna, pp. 93 – 105. DOI: 10.56065/HRM/2026.93

## 1. Introduction

Artificial intelligence (AI) is rapidly becoming a key enabler in the transformation of human resource management (HRM) in modern organizations. Traditionally, HR departments have performed primarily administrative functions – maintaining records, hiring and training, managing compensation, and complying with labor laws. In the past, these tasks were highly manual and time-consuming, relying on paperwork and face-to-face meetings. In the late 20th century, the advent of human resource information systems (HRIS) automated some processes and improved efficiency, but HR was still largely reactive, focused on day-to-day operations rather than strategic initiatives (Kanade, TM, Batule, R., & Joseph, J. 2025).

The advent of AI over the past decade has been a revolutionary transition for the HR field. Modern AI technologies – machine learning, natural language processing (NLP), predictive analytics, etc. – have the potential to transform HR from a support function to a strategic business partner. For example, AI-based recruitment systems can analyze thousands of resumes in a fraction of the time it would take a human, identifying the most suitable candidates based on set criteria, which speeds up hiring and reduces bias and selection errors. AI also enables more personalized and effective employee management – through constant monitoring and data analysis, AI-based systems provide real-time feedback and individual development recommendations, which improves employee performance assessment and satisfaction.

Globally, organizations are increasingly using AI to enhance workforce productivity and engagement. HR practices are evolving from intuitive management to data -driven HR . The integration of AI is further revolutionizing activities such as talent acquisition, performance management, and workforce planning. AI-driven HR uses machine learning and NLP algorithms to automate routine tasks, personalize employee interactions, and provide timely insights for strategic decisions. As a result, AI helps HR departments focus on strategic activities while improving operational efficiency (Selvamohana, K. 2025).

This article examines the role of AI in HR software in detail. It outlines the historical development – from traditional HR to the era of analytics and now to AI-enhanced practices. It then formulates the research problem: how AI is changing HRM, what are the benefits and challenges of its implementation, and how empirical data supports these observations. The main goal is to investigate how the integration of AI into HR software affects the effectiveness of HR processes, employee engagement and strategic decision-making, as well as to identify the conditions for successful implementation and potential risks.

## 2. Methodology

This study uses a qualitative approach based on a literature review and case study analysis to examine the impact of AI in human resource management. A systematic review of recent scientific publications, reports, and case studies (mainly published in 2023–2025) that address the implementation of AI in HR was conducted. Sources include academic articles and conference proceedings, providing a variety of perspectives – from conceptual frameworks and models for AI implementation to empirical studies across countries and industries. Specific case studies and studies were selected to integrate empirical data: (1) a study on the challenges of implementing AI in HRM in the corporate sector of Kazakhstan, based on a survey of HR professionals (Polturi & Serikbay 2025); (2) a case study on the impact of AI on sustainable HR practices among women entrepreneurs in the Indian state of Assam (Kanade, Batule & Joseph 2025); (3) thematic analyses of the role of AI chatbots in improving the work experience of employees (Peicheva 2024, Sakib, Salehin, Younus, Al-Omari, Sahabuddin, & Tabash, 2024); (4) review articles on the evolution of HR from traditional to AI-assisted (e.g., a book chapter on the AI transformation of HR); and (5) research on AI analytics in HR for decision-making about employee development (Young, Adams, Baker & Paul 2025).

The methodology involves a comparative analysis of results from different sources, looking for common themes and complementary insights. Based on the literature review, the main applications of AI in HR, benefits (expected positive effects) and challenges (obstacles and risks) are identified. Empirical examples are used to illustrate the real impact – quantitatively (statistically significant results from studies) and qualitatively (specific examples of implemented AI solutions). The study accepts the limitations that it does not represent primary data collection, but relies on already published research; therefore, the validity of the conclusions is directly dependent on the reliability of the cited sources. However, synthesizing many sources helps to form a comprehensive picture of the current state of AI in HRM by 2025.

## 3. Applications of AI in HR management

The applications of AI in HR range from talent acquisition and employee engagement to performance evaluation and predictive workforce analytics. By leveraging AI, organizations can improve efficiency, reduce bias, and make more strategic, data-driven HR decisions.

### 3.1. AI chatbots and virtual assistants

One of the most common applications of AI in HR is chatbots, which serve as virtual HR assistants. According to Prof. Peicheva, these intelligent systems, powered by NLP and machine learning, provide employees with instant assistance – answering questions, guiding them through HR processes and easing the workload of the HR team. AI-driven HR chatbots can take on multiple functions: onboarding by guiding new employees through documentation, training and familiarization with the rules; HR helpdesk support by answering routine inquiries about policies, salaries and benefits 24/7; collecting feedback on performance; processing leave and attendance requests; recommending training and development opportunities (Peicheva 2024). For example, when onboarding new employees, chatbots can provide the necessary forms and information, which reduces the need for direct HR intervention and speeds up the employee's integration into the company. In HR support services, a chatbot automates answers to frequently asked questions about company policy or benefits, thereby reducing response time and freeing the HR team for more complex cases Nacheva & Czaplewski, 2024, Budziewicz-Guźlecka & Antonova, 2024). AI-powered chatbots and virtual assistants provide voice-activated navigation and instant accessibility support (Chetana, 2024). As these

technologies continue to evolve, organizations are expected to experience greater inclusivity and improved workplace efficiency for people with disabilities (Nacheva, 2025).

The effectiveness of AI chatbots is supported by data: according to a Gartner report (2023), organizations using HR chatbots report a 40% reduction in HR department workload and a 30% improvement in employee engagement (i.e., higher levels of satisfaction and participation). This is due to faster service – employees do not wait days for a response from HR, but receive it instantly from a chatbot, which improves their experience. Another study reports that AI-based HR solutions such as chatbots contribute to increasing workplace efficiency by automating administrative tasks and improving access to HR services (Mercy & Bayya, Anil & Ejjami, Rachid & Mansour, 2025).

AI in Recruitment. AI – powered automation is radically changing the recruitment and selection process. Automated resume screening is a key example: AI tools use NLP to scan and evaluate applications against job requirements, saving recruiters time and reducing subjectivity in the initial selection process . Kanade et al. (2025) note that these technologies are revolutionizing hiring by enabling CV filtering and predicting hiring success based on candidate history. In other words, AI can predict which candidates are more likely to perform well and stay long-term, helping managers make more informed decisions.

In addition to CV processing, AI is also used in talent sourcing and acquisition – for example, algorithms that search online platforms and databases to find suitable candidates (sourcing), or systems that assess candidates' online presence and skills. AI chatbots in recruitment are also a valuable tool: they can engage with candidates from the first contact – answering frequently asked questions, scheduling interviews and providing real-time updates on the recruitment process. This creates a smoother experience for candidates and proactively engages them. Predictive analytics in recruitment analyzes historical hiring and performance data to predict which candidates are likely to perform well and stay longer, reducing the risk of turnover. Ilesanmi emphasizes that such AI solutions in selection not only increase efficiency, but can also reduce bias – for example, automated CV scanning focuses on objective criteria, minimizing unconscious human preferences, and algorithms for detecting discriminatory wording signal bias in advertisements or criteria (Ilesanmi 2025).

### 3.2. Training, development and induction of employees

AI is making a significant contribution to personalizing learning and development. AI-powered learning management systems (LMS) can create personalized training programs tailored to each employee's needs, role, and learning style. For example, a new employee can receive a customized course that covers the exact skills they are lacking, with AI monitoring progress and adjusting content for optimal learning. AI virtual assistants also facilitate the onboarding process – they are available to new employees to answer questions, provide timely guidance (for example, where to find certain information or who to contact for a specific issue), and even provide real-time training through interactive FAQs. This speeds up the integration of new employees, reduces onboarding costs and time, and increases employee satisfaction and readiness for work. Performance and engagement management. AI introduces more dynamic performance management through continuous monitoring and analysis. Through sentiment analysis of internal communications or periodic surveys, AI tools can „take the pulse" of organizational climate – detecting a decline in mood or signs of dissatisfaction among employees, signaling managers to intervene proactively. For example, AI can track the tone of comments in a corporate chat and report if the team is highly stressed or demoralized. Also, predictive turnover models identify which employees are at risk of leaving, based on behavioral patterns (e.g., decreased productivity, reduced participation, changed work behavior). This allows HR and managers to take timely measures – conversations, development proposals, or changes in conditions – in order to retain valuable personnel. AI also supports employee well-being – some systems analyze health and activity data (for example, from wearable devices, if the company has corporate wellness initiatives) to identify the need for well-being programs, workload balancing, etc. In addition, AI can provide timely feedback – instead of relying only on annual assessments, intelligent platforms collect ongoing data and provide automatic reports or recommendations to managers and employees, so that adjustments and recognitions can be made in real time.

### 3.3. Diversity and inclusion

An interesting application of AI is in supporting diversity and equity efforts in human resource management. AI can reduce unconscious bias in hiring and promotion by providing objective, data-driven insights for candidates and employees. For example, there are AI systems that analyze the content of job postings or evaluation forms to detect potentially biased or discriminatory language – and suggest edits to attract a more diverse pool of candidates. Other tools track diversity metrics (e.g. gender or ethnic diversity by level, promotion rates and minority hires, etc.) and produce real-time reports, allowing management to track progress and make informed adjustments to inclusion policies. Ultimately, AI can become a „guardian“ of objectivity – a decision support system that signals when subjective factors (biases) start to take hold, thereby helping to create a more inclusive work environment (García-Madurga, Gil-Lacruz, Saz-Gil, & Gil-Lacruz, 2024).

## 4. Benefits of integrating AI into HR

Summarizing the applications, it is clear that implementing AI in HR brings multiple benefits to organizations. At a strategic level, AI enables data-driven decision-making, which significantly improves the quality and speed of HR decisions compared to traditional intuitive management. Young et al. (2025) point out that AI for HR analytics makes HR management more proactive – instead of reacting after a problem occurs (turnover, unfilled positions, low engagement), organizations can anticipate trends and needs and act preventively.

**Increased efficiency and productivity.** Automating routine and time-consuming tasks (such as sorting CVs, scheduling interviews, answering frequently asked questions) frees up significant time for HR staff. This time can be redirected to high-value activities – talent development strategy, engagement initiatives, organizational planning. In addition, automation reduces the risk of errors (for example, in compensation calculations or data processing), increasing the accuracy of HR processes. As a result, overall operational efficiency improves, which also contributes to business results (faster hiring = faster filling of needed roles, better planning = optimal allocation of resources).

**Improved employee experience.** Through AI tools, employees receive better and more timely support from HR. As already noted, chatbots facilitate access to information and services, which increases satisfaction. AI can also personalize interactions – for example, a training system that offers relevant courses according to the career of a particular employee, or a feedback platform that provides specific improvement tips based on individual performance. According to one study, AI increases employee engagement and satisfaction, as they feel more individualized and receive timely responses to their needs. At an organizational level, this means higher motivation, a better climate, and possibly lower turnover.

**Optimized performance management and development**. AI helps HR uncover hidden patterns and trends in employee data. For example, performance analytics can identify specific skills that are lacking in the organization, or groups of employees who are facing similar challenges. This enables targeted training and development programs that improve competencies exactly where they are needed. Also, by predicting skill gaps and learning needs, the company can proactively prepare its employees for future requirements, creating a more adaptive and flexible workforce. Ultimately, organizations that have implemented AI in HR data analytics report higher workforce productivity and improved engagement – employees feel supported in their development and valued through more transparent and evidence-based evaluation processes.

**Reducing bias and fairer HR processes.** Human decisions in HR – hiring, evaluating, promoting – can be unintentionally influenced by subjective biases. Well-designed AI systems have the potential to make these processes more objective and meritocratic. As discussed, algorithms can remove identifying information (gender, age, ethnicity) in pre-selection or evaluate candidates only on relevant skills and experience. This helps build a more diverse and inclusive team. In the case of women entrepreneurs in Assam, for example, the implementation of AI selection tools (such as automated selection systems – ATS) has led to a more impartial hiring process, in which female employees receive equal opportunities and organizations benefit from an expanded talent pool. Roy & Shakya (2025) note that this contributes to the flourishing of female

entrepreneurship – when HR practices are fair and data-driven, an environment is created where capabilities, not stereotypes, determine success.

**Better workforce planning and lower turnover.** Through predictive models, AI helps HR departments anticipate future needs – for example, when and where there may be staff shortages, which departments are at risk of burnout or departure of key talent, how demographic trends will affect skill availability, etc. Potluri & Serikbay (2025) note that even in emerging markets such as Kazakhstan, the potential of AI to address talent shortages and improve HR functions is recognized, especially in high-dynamic projects such as engineering and construction. Through AI, companies can remain competitive by having tools for flexible workforce planning in an increasingly complex and dynamic business context.

In summary, AI-driven HRM is not just a technological novelty, but a strategic necessity for modern business. Selvamohana and co. (2025) conclude that for companies that want to sustainably develop a highly effective and adaptive workforce, the integration of AI into HR practices is becoming a critical factor – AI enables them to drive staff productivity and engagement to a new level, while competition that lags behind in implementation risks being overtaken.

## 5. Challenges in implementing AI in HR

Despite the numerous opportunities, implementing AI in HR also comes with serious challenges. Organizations must overcome these barriers to fully realize AI's potential while minimizing risks to employees and the business.

### 5.1. Cultural resistance and the human factor

One of the biggest obstacles is human resistance to change – both employees and managers may be skeptical or uncertain about AI systems. In some corporate cultures, personal relationships and intuition are valued more than data-driven decisions. This is especially true in environments where HR practices have traditionally been highly people-oriented. For example, a study in Kazakhstan shows that cultural resistance significantly hinders the adoption of AI – employees and managers may perceive AI as a threat to existing work norms or even their jobs. Potluri & Serikbay (2025) statistically confirm that cultural resistance is a significant factor ($p = 0.028$) in the implementation of AI in HRM in Kazakh companies, which is consistent with the findings of other studies. Resistance can manifest itself as distrust of algorithmic solutions ("the computer cannot understand the human"), fear of losing control, or even active obstruction of AI initiatives. That's why change management and employee engagement are critical – clearly communicating the benefits of AI, training on how to use the new tools, and reassurance that AI complements, not replaces, the human role are needed (e.g., the AI-human collaboration model emphasizes that AI should be used to augment human expertise, not displace it).

### 5.2. Lack of skills and competencies (Skill Gaps)

Another serious barrier is the lack of the necessary skills among HR professionals to work effectively with AI tools. Implementing AI requires HR teams to acquire at least basic knowledge of data and technology – skills in working with analytical platforms, understanding concepts such as machine learning, the ability to interpret AI-generated insights. If HR staff do not have these competencies, AI projects can fail or remain underutilized. In the Kazakhstani study, the „skills gap" among HR specialists was identified as a significant stopping factor. 456 of the respondents there expressed concern that the lack of sufficiently trained personnel hinders the effective implementation of AI. Statistically, the „skills gap" factor also turns out to be significant – the results support the hypothesis that the lack of skills significantly negatively affects AI initiatives in HR (at a confidence level of 95%). This problem is not isolated – on a global scale, many organizations report that they lack sufficient expertise in data management and AI in the HR department. For example, Bulgaria ranks 26th (37.74%), while the EU-27 average is 52.3%, with the level of digital skills in the country being among the lowest in the EU (Antonova & Chaparov, 2025). The solution requires investing in training and reskilling HR staff – digital literacy programs, including data specialists in HR departments, or working closely with IT

and analysts. Ilesanmi (2025) notes that without addressing these skills gaps, the full potential of AI may remain untapped. Therefore, organizations need to develop a plan to develop competencies – from technical (working with AI systems) to conceptual (understanding the limitations and opportunities of AI in order to implement it strategically) – so that HR professionals are confident in using new technologies.

### 5.3. Integration with existing systems and infrastructure

A technical challenge is integrating AI tools with existing systems in the organization (e.g. ERP, legacy HRIS platforms, databases). In many companies, the HR infrastructure has been built over years and may include legacy systems that do not support easy integration with modern AI solutions. Connecting an AI tool (e.g. a predictive analytics module) to an outdated HR database can require significant modifications or even a complete upgrade of the systems. This is an expensive and complex process, especially for smaller companies or those with limited budgets. Interestingly, in the cited Kazakh study, the hypothesis „integrating AI with existing systems affects implementation“ was not statistically confirmed (i.e., it did not turn out to be a significant factor in itself). The researchers note that barriers such as culture, cost, and skills were so dominant that the impact of technical integration was relatively weaker in the context of their model. However, other data from the same study showed that 620 of the respondents considered integration with other systems to be a serious barrier. This suggests that while it may not have been the most significant factor on its own, the integration problem is real and often goes hand in hand with the need for significant investment and change. For companies with an outdated technology foundation, it may be necessary to first modernize their IT infrastructure or implement intermediate solutions (e.g., through API connectors, specialized integration software) in order to be able to effectively use AI. If this is not addressed, projects may encounter technical issues, interruptions, or incomplete function

### 5 4. Financial constraints and return on investment (ROI)

Implementing AI solutions typically requires significant investments – purchasing or developing software, hiring experts, training staff, and potentially hardware to process big data. Many organizations, especially smaller ones or those that view HR as a cost center, are wary of such investments. They ask themselves: will the investment pay off? What concrete benefits (savings or increased profits) will AI bring? In some cases, the lack of a clear business plan or ROI metrics stops projects in their tracks. Data from the corporate sector in Kazakhstan suggests that high implementation costs are among the key challenges – the „investment costs“ factor is statistically significant with $p = 0.018$, confirming that the higher the perceived costs, the less likely the company is to successfully implement AI. Especially for smaller enterprises, investing in AI may seem unjustified without guarantees of return. In addition to direct costs, there are also hidden costs to consider – implementation time, temporary productivity losses while people are trained, and costs to maintain and upgrade AI systems. All of this requires careful planning. Organizations should implement in phases (as recommended by Tasleem et al., 2025) – starting with small-scale pilots where they can measure the impact before investing on a larger scale. It is also necessary to create key performance indicators (KPIs) that show, for example, that AI has saved a certain number of man-hours, improved time to hire by X%, reduced turnover by Y%, etc., to justify the investment to senior management.

They recommend that organizations take a step-by-step and responsible approach: assess their level of digital maturity, develop a clear AI strategy that matches the level of development of the organization, start with small pilots and gradually escalate. It is imperative that the implementation is accompanied by the establishment of privacy policies, training initiatives for staff and a focus on the human – AI solutions must be oriented towards facilitating the work of people, and not just technology for the sake of technology. Only with such preparation will the transformation of HR through AI be successful.

## 6. Empirical examples and analyses

To illustrate the above results, in this section we present several specific empirical findings from real-world research and case studies that provide quantitative support for the claims about the impact of AI in HR.

**Case 1:** A study in corporate Kazakhstan – the impact of challenges. A study published in the International Journal of Asian Business and Information Management (Potluri & Serikbay, 2025) examines the factors that hinder the implementation of AI in the HR practices of Kazakhstani companies. It is based on a survey among HR professionals in different sectors (construction, IT, manufacturing, etc.) and statistical analysis (SEM-PLS model) of five hypotheses. The results clearly show that the main challenges are: cultural resistance (H1 confirmed, $p = 0.028$), high investment costs (H2 confirmed, $p = 0.018$) and lack of skills in the HR team (expected H4, also significant). On the other hand, an interesting result is that the challenge of integration with existing systems (H3) does not reach statistical significance and is rejected by the model (i.e., it did not predict the success of AI implementation by itself). This does not mean that technical integration is not a problem, but rather that its influence is intertwined with the other factors. Furthermore, H5 (the combined effect of all challenges) is logically confirmed – the more obstacles in total, the more difficult the implementation. Additional data from the survey reveals the scale of these problems: ~716 of the participants agree that cultural resistance, high costs, integration problems, and lack of skills TOGETHER have a strong negative impact on the adoption of AI in HR in Kazakhstan .

This study also highlights the need for leadership support and a culture that embraces innovation to overcome barriers. The authors conclude that organizations need to develop „organizational readiness“ – a strong commitment from top management and a culture that embraces innovation – to successfully navigate the challenges. They also recommend creating a clear regulatory framework at the national level, as the lack of such rules (for AI, data, etc.) is an additional complicating factor, creating a risk of legal problems during implementation. In summary, this case study quantifies which factors most hinder AI initiatives (culture, cost, skills) and confirms that a holistic approach – technical and organizational-management – is needed for these initiatives to be successful.

**Case 2**: Women Entrepreneurs in Assam, India – the Impact of AI on Sustainable HR Practices. Another interesting empirical study is by Roy & Shakya (2025), published in the International Journal of Innovations & Research Analysis. It examines whether and how the use of AI technologies in HR practices impacts the sustainable growth of businesses led by women entrepreneurs in the state of Assam. The context here is particularly interesting – small and medium-sized enterprises led by women in a developing economy that face typical problems (limited access to finance, social challenges, technological barriers). The authors conduct regression analysis to test the hypothesis that the use of AI in HR (e.g. for recruitment, training, assessment) leads to more sustainable HR practices and, indirectly, to business success.

The results are impressive: a highly significant positive relationship was found between the implementation of AI in HR processes and indicators of sustainable business growth. The p-value is extremely low ($p = 3.04\times10^{\wedge-22}$), i.e. practically zero, which confirms that the impact of AI is statistically convincing. The regression model shows that the inclusion of AI explains about 61.5% of the variation in the growth indicators of women-owned businesses – meaning that more than half of the success (by these metrics) is associated with the use of AI in HR practices. In short, women entrepreneurs who integrate AI into their personnel management achieve significantly better results in terms of sustainability and growth of their businesses than those who do not. Specifically, one of the most important contributions of AI, according to the study, is in the area of selection and hiring (staffing). The introduction of tools such as ATS (Applicant Tracking Systems) has helped to build a more impartial and equal work environment – AI has eliminated some biases and barriers, thereby enabling more female employees to get a chance and develop. The authors note that the result is an „unbiased employee base“ where female employees receive equal opportunities and female entrepreneurs' business approaches flourish. This is especially valuable because one of the problems in the region has been bias or traditional attitudes limiting women in business – AI has helped to mitigate these barriers through more objective HR processes.

The study also highlights some obstacles: many female entrepreneurs lacked investment and knowledge to implement AI, which limited its initial mass adoption. But where AI has been implemented, the impact has been overwhelmingly positive. The conclusion states that issues such as gender bias can be effectively mitigated with AI, but also highlights the need for more support – financial, educational and infrastructural –

for these entrepreneurs to adopt AI in their practices. This case study is valuable because it shows a real measurable impact: AI is not just an abstract concept, but a tool that, even in a small business environment, can lead to tangible improvements – more sustainable HR practices, which in turn are linked to business growth, innovation and the achievement of social goals (more women included in the economy). This confirms the thesis that AI, when implemented correctly, empowers HR and contributes to the achievement of strategic goals such as sustainability and inclusion.

**Case 3:** Global Trends – When AI Succeeds and When It Fails. In addition to academic research, practical industry experience also provides empirical lessons. Reports from consulting firms and HR organizations (SHRM, Deloitte, McKinsey) constantly monitor the penetration of AI into HR. One global report (Gartner, 2023) cites that 38% of HR leaders are already actively implementing AI-based solutions, and 76% fear that they will be left behind if they do not do so in the next two years. This shows that the pressure to adapt is palpable. At the same time, over 70% of these implementing organizations face challenges such as data privacy issues, employee resistance, or data quality issues. In real-world corporate cases: high-tech companies (e.g., IT) show the fastest adaptation and agility in experimenting with AI, while traditional industries such as manufacturing or healthcare have more operational hurdles—e.g., highly regulated processes, legacy systems, and strict accuracy requirements that make implementation slow. Tasleem et al. (2025) note in their industry benchmarking that the IT industry demonstrates high agility and readiness to pilot AI, while manufacturing and healthcare struggle with weak system structures, regulatory barriers, and inadequate data management practices. This is also consistent with observations that sectors with a mature digital culture (e.g., technology, finance) are making the most progress, while others need to catch up in digitalization before they can benefit from AI.

Unsuccessful examples are usually due to hasty implementation without preparation: companies that buy an AI system but do not have clean data or training for staff – the result is that the system sits unused or generates „unfulfilled dreams“ (high expectations, low implementation). As discussed, such cases lead to low adoption (employees do not adopt the new tools), incomprehensible algorithms (which generate distrust because no one can explain why AI gives a certain result), inconsistent data (poor quality of input data leads to irrelevant outputs) and dissatisfied stakeholders (HR, managers, employees – all disappointed that „AI did not work as advertised“) . On the other hand, successful organizations apply a systematic approach – assess their maturity, introduce AI first in a limited area (e.g. only in recruitment or only for engagement analysis), measure the results, adjust, scale. They also pay attention to the issue of trust – implement principles of responsible AI, i.e. algorithms are transparent, results are monitored for bias, and there is human oversight (human in the loop) for critical decisions. For example, some companies use AI to pre-screen candidates but leave the final decision to a human and inform candidates that AI was part of the process – this transparency helps build trust. In summary of the empirical data: where AI is applied with an understanding of the context and in combination with organizational change, the results are impressive – accelerated processes, better decisions, happier employees and real business growth. But where the human factor, preparation and ethics are neglected, projects suffer or even fail.

## 7. Discussion

The results of this study, supported by the literature and case studies, paint a comprehensive picture of AI in HRM: there is both a huge potential for improvement and significant obstacles to overcome. In this discussion, we will interpret these findings, compare them with expectations, and formulate recommendations and future directions. AI as a driver for strategic HR. One of the central themes is the transformation of HR from an operational function to a strategic partner, made possible by AI. The data shows that when routine tasks are automated, HR professionals can focus on strategic initiatives – talent development, organizational development, culture. This also reflects on the way HR is perceived within the organization: instead of an „administrative department“, HR (assisted by AI) is positioned as an evidence-based player, similar to finance or marketing, where analytics have long been part of the strategies. As highlighted by Selvamohana et al. (2025), AI-driven HRM is no longer a luxury, but a strategic necessity for companies that want to build a

resilient and highly effective team in the digital age. This is an important conclusion – company leaders need to understand that investing in AI for HR is an investment in building a competitive workforce and that the cost of inaction can be talent loss, low productivity and lagging behind.

**The need for a balance between technology and humanity.** A recurring point in our analysis is that AI should not be seen as a replacement for humans, but as a tool to enhance the human role. The most successful cases are those in which AI does what it does best (processing massive data, detecting patterns, fast calculations) and humans do what they do best (making decisions with regard to ethical, cultural and contextual factors, building relationships, creativity and empathy). For example, AI can assess a candidate's competencies, but the final live interview allows for a sense of cultural fit and motivation – two dimensions that still require human judgment. Many authors (including in the cited sources) emphasize the AI-human collaboration model. Wilson & Daugherty (2018) speak of „collaborative intelligent systems", where AI augments the capabilities of HR professionals rather than usurps them. This is also supported by practical observations: companies that involve HR in the design and implementation of AI (instead of imposing the technology unilaterally) have higher success because people feel in control and participation, not threat. In this regard, cultural transformation is inextricably linked to technological transformation. You cannot successfully implement AI in an HR culture that does not value data, transparency and learning. Therefore, management must work in both directions – to educate AI about people (i.e. tuning and ethics), but also people about AI (changing mindsets, gaining trust and new skills).

In this regard, cultural transformation is inextricably linked to technological transformation. You cannot successfully implement AI in an HR culture that does not value data, transparency, and learning. Therefore, management must work in both directions – to educate AI about people (i.e., setup and ethics), but also people about AI (changing mindsets, gaining trust, and new skills).

**Ethics, transparency and legislation – foundations for trust.** As we have seen, ethical issues are not theoretical – there are already cases of algorithms in HR that discriminate, or employees who oppose the „black box". For AI to really contribute, the trust of employees and society in these systems is critical. This requires several things: – Companies need to adopt the principles of Explainable AI (XAI) – for example, if AI assesses employee performance, employees themselves should have access to an understandable explanation of why they receive a given rating or recommendation, as well as the opportunity to 43 76 12 challenge or discuss the result with a human. – It is necessary to clearly define the limits of automation: which decisions can be made by AI independently and where human control is necessarily involved. It is probably most ethical for important decisions (hire, dismissal) to always have human intervention while AI prepares the data and recommendations. – Internal data protection policies need to be updated to cover the new realities: employees need to know what data is being collected, what it is being used for, and have confidence that their data is being processed responsibly. Some organizations even involve employee representatives in the introduction of AI (e.g. unions, ethics boards) to ensure that the process is consultative and transparent. – Lawmakers around the world are still shaping the framework for AI. While the HR sector is not yet specifically regulated for AI, existing regulations (on personal data, on employment discrimination) already apply to algorithms. That is, if an AI arbitrarily excludes a candidate with a certain characteristic, the company is responsible as if a human had done it. Future regulations (e.g. the EU draft AI regulation) are expected to classify algorithms for personnel selection as high-risk, requiring additional accountability and transparency mechanisms. Organizations that proactively implement these mechanisms now will have an advantage in avoiding legal risks and building a reputation as a responsible employer

**Organizational Readiness and the HR AI Maturity Model.** Another important topic is that AI does not exist in a vacuum – its success depends on the organization's readiness to embrace it. Tasleem et al. (2025) make a compelling case that companies need to do their homework (digitalization, process discipline, change management) before relying on AI to solve their problems. Otherwise, they risk a mismatch between expectations and reality ("AI dreams meet HR realities"). In this context, companies could assess their maturity based on the key components: – Data: Is there enough historical HR data available? Is it clean, structured? If not, the first step is to invest in HRIS, data collection and cleaning. – Technology

infrastructure: Are there compatible systems, APIs, computing resources (including the question of whether to use cloud services for AI, which raises security and privacy issues)? – Processes: Are HR processes standardized and optimized? If a company does not have established processes, automating them can only accelerate chaos. In such cases, process reengineering is recommended first, then automation. – People: Is the culture data-driven? Is the HR team, and more broadly, managers, ready to accept recommendations from AI? If decisions in the company are traditionally made hierarchically or by a „feeling of right," the implementation of AI will meet passive resistance until the mentality changes to a more evidence-based approach. In addition, as we discussed, the HR team must have the necessary skills (it may be necessary to hire new roles, such as HR analyst, HR technologists). – Leadership: Does top management support AI initiatives not only with words, but also with resources and personal example? Without a high-level champion, it is difficult to overcome internal barriers.

Assessing these aspects will help build a realistic roadmap for AI implementation. For example, if the assessment shows low data and skills maturity, the company may decide to first invest in an HR analytics platform (for simpler analytics) and training, and only at a later stage – in more complex AI solutions

**Future trends.** Looking ahead, we can predict several developments: – Easier accessibility of AI (democratization): As a result of the emergence of low/zero-code platforms, AI solutions will become increasingly accessible to non-technical professionals, including HR teams without an IT background. Ilesanmi (2025) points out that low-code/no-code tools will allow HR, 68 57 13 marketing or finance professionals to develop and deploy simple AI models themselves without writing code. This could somewhat overcome the skills problem, as long as staff are trained to use these easier tools. – Cross-departmental data integration: In the future, AI systems are expected to merge data from different business domains for more holistic insights. For example, combining HR data with marketing and finance data could reveal interesting dependencies (e.g. how employee engagement affects customer satisfaction or sales). This would position HR even more strategically – as a function that directly contributes to competitiveness through its people, and AI would help quantify this contribution. – Human-centered AI: There will be an increased focus on designing AI that works for the benefit of humans. This includes both improving the user experience (UI/UX of AI tools to be intuitive and enjoyable for HR and employees) and models that take into account human behavior and emotions. For example, AI chatbots become more empathetic – they are trained to recognize tone and emotion to respond more appropriately. Or development recommendation systems that, in addition to data, also take into account preferences and career goals shared by the employee himself. – Increased importance of „explainability" and regulation: Organizations and regulators are expected to require evidence of lack of bias in AI models, AI audits (similar to financial audits), certification. HR will need to work with legal and IT departments to ensure that AI used in people management complies with laws and best practices. This may also lead to new roles – for example, an AI ethics officer, internal algorithm auditors, etc.

In light of all the above, recommendations for practice include: 1. Develop a comprehensive HR AI strategy aligned with the business strategy to ensure that AI initiatives have focus and purpose (e.g. improving specific KPIs such as time to hire, engagement, retention). 2. Start with pilots in areas where there is readiness and that will bring quick wins – for example, implementing a chatbot to answer FAQs or using AI to analyze the results of employee surveys – and gradually expand. 3. Invest in the human capital of the HR department – training in People Analytics, basic knowledge of Data Science for HR, hiring multidisciplinary staff (e.g. people with mixed HR and IT backgrounds). 4. Involve employees as participants – communicating the changes, collecting feedback on the new systems, correcting the course according to this feedback. For example, if employees feel uncomfortable with constant monitoring, you can revise what data is collected or give them the option to opt out of certain less critical functions. 5. Establish ethical norms and policies for AI: create an internal code or guide for responsible implementation of AI in HR that specifies principles of privacy, transparency, validity and fairness. This could include a commitment to periodically check algorithms for bias and correct them when necessary. In conclusion, the integration of AI in HRM turns out to be a path that requires responsibility and proactivity. It cannot be achieved in a one-time act, but is a learning process – for the organization as a collective. Companies that

successfully combine technological innovation with a human approach and address the challenges will reap the rewards in the form of more effective HR practices, more engaged and productive employees and a more competitive business.

## 7. Conclusion

Summary of key findings: Artificial intelligence is already significantly transforming the functions of human resource management software. In this paper, we examined key applications of AI in HR – from AI chatbots that automate employee service, to selection algorithms that revolutionize hiring, to analytics platforms that support strategic HR decisions. The analysis confirms that AI can significantly increase the efficiency of HR processes, improve decision-making, and enrich the employee experience. As a result, HR departments can focus more on a strategic role – developing talent and culture – and leave the operational details to automation.

Empirical examples support these claims: companies that have adopted AI report faster and better hires, higher levels of employee engagement and retention, and in specific cases (such as women's entrepreneurship in Assam) – more sustainable and inclusive business growth. At the same time, studies identify real obstacles – cultural reluctance to change, lack of skills, privacy concerns, high initial investments. Implementing AI in HR is not a trivial task and success depends on whether organizations will take a systematic approach to addressing these challenges. Contribution and relevance: This article contributes by bringing together current scientific sources and case studies to present a comprehensive view of AI in HRM. For the academic community, the contribution lies in synthesizing the literature with fresh empirical data, which outlines where the scientific and practical discourse stands in 2025 – what benefits have already been proven, which concerns are being realized, and how solutions are being shaped. For practitioners (HR managers, business leaders, HR software developers), the significance is expressed in the specific insights derived: which AI applications give the fastest effect, what barriers to expect and how to overcome them, what to pay attention to when implementing (ethics, transparency, training). In this way, the development serves as a guide – how to take advantage of AI for HR without underestimating the risks. Limitations of the study: A major limitation is that it is based on existing sources and does not include primary data collection. Therefore, the validity of the conclusions depends on the quality and relevance of the cited studies. The aim was to use new (2023–2025) and diverse sources (scientific articles, case studies, reviews) in order to minimize bias. However, it is possible that some statements are contextually conditioned – for example, a result valid in Kazakhstan may not fully apply elsewhere. Another limitation is the dynamism of the field: AI technology is evolving literally daily; therefore, some trends mentioned here may evolve quickly.

Recommendations for future research: Given the limitation just mentioned, there is a need for long-term (longitudinal) studies on the impact of AI on HR metrics – for example, tracking companies before and after implementing AI and how their HR success metrics (turnover, engagement, time to hire, etc.) change. Also, qualitative research (interviews, focus groups) would be valuable to understand in depth the experiences of employees and HR professionals working side by side with AI. A topic that deserves more attention is AI and HR leadership – how HR leaders make decisions based on AI recommendations, and whether this changes their style. Another recommended question is the effect of AI on HR roles and skills going forward – whether entirely new specializations will emerge (e.g., „HR AI strategist"), and how educational programs should adapt.

In conclusion, „Artificial Intelligence in HR Software" is not just a current topic, but a trajectory that the HR profession has taken. As one source notes, we are at a turning point – HR is no longer just an administration, but is becoming a scientifically based, technologically supported function that actively contributes to business success. To realize this promise, organizations must simultaneously embrace AI and invest in their people – to cultivate an environment of learning, flexibility and ethics. Then AI will be neither a „rocket assembled with blueprints on a wheel" nor a threat, but a natural extension of the evolution of HR in the service of the person and the organization (Tasleem, Saddi, Ansari, Raghav & Sharma, 2025).

**References**

1. Anguelov, Kiril, 2023. "ICT as the New Age of Development of HR Management," Chapters, in: Diana Da Silva Dias & Carla Magalhaes (ed.), *People Management – Highlighting Futures*, IntechOpen. DOI: 10.5772/intechopen.106929

2. Antonova, K., Chaparov, B., Digital transformation of the construction sector in Bulgaria – advantages and challenges. Real Estate Property & Business : Recenzirano adameichno spisanie, Sofiya, Izd. Kompleks UNSS, 9, 2025, 1, 17, ISSN(pechatno) 2603-2759, ISSN(online) 2603-2767

3. Budziewicz-Guźlecka, A., Antonova, K. (2024) Digitalization as an Element of Development and Challenges in the Tourism Sector. Journal „Човешки ресурси & Технологии = HR & Technologies“, Creative Space Association, 2, pp. 17 – 31.

4. Chetana, C. (2024). Chatbots and virtual assistants in e-commerce: Transforming customerservice and engagement. International Journal of Research Publication and Reviews,5(10), 1521–1528. https://doi.org/10.55248/gengpi.5.1024.2743

5. Dineva, V. (2023). Aktualni prioriteti na vatreshniya odit v oblastta na choveshkite resursi. Trudat i socialnata zashtita v usloviyata na globalni obshtestveni, ikonomicheski i socialni promeni: Sbornik s dokladi ot Yubileyna nauchna konferenciya (s. *338-349)*. Sofiya, Izdatelski kompleks – UNWE; Katedra „Choveshki resur.

6. Ilesanmi, M. (2025). AI in Non-Technical Domains: Empowering HR, Marketing, and Finance. *Nature Machine Intelligence* 4(7):611-613 DOI: 10.1038/s42256-022-00512-5

7. García-Madurga, M.-Á., Gil-Lacruz, A.-I., Saz-Gil, I., & Gil-Lacruz, M. (2024). The Role of Artificial Intelligence in Improving Workplace Well-Being: A Systematic Review. Businesses, 4(3), 389-410. DOI: https://doi.org/10.3390/businesses4030024

8. Kanade, T. M., Batule, R. B., & Joseph, J. (2025). The Evolution of HR: From Traditional to AI-Enhanced. In S. Harriott (Ed.), Innovative Approaches to Managing Conflict and Change in Diverse Work Environments (pp. 49-78). IGI Global Scientific Publishing. DOI: https://doi.org/10.4018/979-8-3693-9556-1.ch003

9. Mercy, Olaosegba & Bayya, Anil Kumar & Ejjami, Rachid & Mansour, Fedaa. (2025). The Role of AI-Driven HR Chatbots in Enhancing Employee Experience and Organizational Efficiency. Retrived from https://www.researchgate.net

10. Miglena Angelova, Tsvetana Stoyanova, & Stoyanov, P. (2023). Improving HR management in innovative business organizations through digitalization and ICT. Entrepreneurship and Sustainability Issues, 11(2), 403–418. https://doi.org/10.9770/jesi.2023.11.2(27)

11. Nacheva, R. (2025). Trends and best practices for ensuring digital accessibility in the workplace. Journal of Process Management and New TechnologiesVol.13, Issue1-2, 2025, pp.56-66. DOI:10.5937/jpmnt13-57500

12. Nacheva, R., Czaplewski, M. (2024). Artificial intelligence in helping people with disabilities: Opportunities and challenges. Journal „Човешки ресурси & Технологии = HR & Technologies“, Creative Space Association, 1, pp. 102 – 124.

13. Nazia Tasleem & Abhishek Saddi & Mohammed Nadeem Ansari & Raghvendra Singh Raghav & Shiva Sharma, 2025. "Don’t Build a Rocket with Bicycle Blueprints: When AI Dreams Meet HR Realities," Journal of Artificial Intelligence General science (JAIGS) ISSN:3006-4023, Open Knowledge, vol. 8(1), pages 162-186. DOI: 10.60087/jaigs.v8i1.362

14. Peicheva, M. (2024). A Model for Using ChatGPT in Attracting and Selecting Human Resources. Godishnik Na UNSS, 1(1), 81–92. DOI https://doi.org/10.37075/YB.2024.1.05

15. Potluri, R. M., & Serikbay, D. (2025). Artificial Intelligence (AI) Adoption in HR Management. International Journal of Asian Business and Information Management, 16(1), 1–18. https://doi.org/10.4018/ijabim.376012

16. Sakib, M. N., Salehin, M., Younus, M., Al-Omari, M. . A., Sahabuddin, M., & Tabash, M. I. (2024). The ChatGPT and the future of HR: A critical review on the benefits and challenges of Al chatbots in human resource management . Multidisciplinary Reviews, 7(8), 2024136. DOI:

https://doi.org/10.31893/multirev.2024136

17. Selvamohana, K. (2025). From HR Analytics to AI-Driven HRM: Enhancing Workforce Productivity and Engagement. Journal of Information Systems Engineering and Management, 10(21s), 578–585. DOI: https://doi.org/10.52783/jisem.v10i21s.3395

18. Tarun Madan Kanade, Radhakrishna Bhaskar Batule, & Joseph, J. (2025, April 18). The Evolution of HR: From Traditional to AI-Enhanced. DOI: https://doi.org/10.4018/979-8-3693-9556-1.ch003

19. Young, J., Adams, J., Baker, N., & Paul, C. (2025). AI in HR Analytics: Enhancing Decision-Making for Employee Growth. International Journal of HR Innovation, 3(1), pp. 33-47. Retrived from https://www.researchgate.net

ISSN (Online): 2815-5084

INTERNATIONAL SCIENTIFIC AND PRACTICAL CONFERENCE ON HUMAN RESOURCE MANAGEMENT
DOI: 10.56065/HRM/2026.106, pp. 106 – 122

7th edition, 3 October 2025
University of Economics-Varna

# Measuring Employee Experience: Metrics and Software Platforms

**Radka NACHEVA[1] and Margarida Maria Mendes RODRIGUES[2]**

[1] Department of Informatics, University of Economics – Varna, Bulgaria, r.nacheva@ue-varna.bg
[2] Instituto Politécnico da Guarda; Cefage-UBI, Guarda, Portugal, rodriguesm@ipg.pt

**JEL: O14, P24, C41, E13**

**Abstract**

Employee experience has emerged as an important factor influencing organizational performance, talent retention, and workplace culture. As organizations increasingly recognize its strategic role, the challenge is in defining, quantifying, and continuously improving experiences at the workplace.

*Background and aim*: Employee engagement is established as one of the factors for organizational effectiveness, and the aim of the study is to analyze the leading thematic directions and methodological approaches in its measurement in scientific literature.

*Scope*: The study is limited to the analysis of a selected corpus of scientific publications, which does not permit a comprehensive generalization of all existing approaches and industry-specific details.

*Methods*: Automated text analysis, TF-IDF, network analysis, and clustering methods were employed to identify key concepts and their relationships.

*Results*: The results show a dominant role in job satisfaction, organizational support and well-being as the main dimensions of engagement in human resource management.

*Conclusions*: The study confirms the need for integrated systems for measuring employee engagement that combine behavioral and organizational indicators.

Originality: The novelty of development lies in the application of specialized analysis and systematization of scientific knowledge about engagement in the workplace.

Practical implications: The results can be used by businesses in developing digital platforms and analytical tools for measuring, monitoring and increasing employee engagement.

**Published by University of Economics – Varna**

**Key words:**

Employee engagement, cluster analysis, text mining, job satisfaction.

*Citation:* Nacheva, R., and Rodrigues, M. (2026). Measuring Employee Experience: Metrics and software platforms. *Proceedings from 7th International Scientific and Practical Conference on Human Resource Management (ICHRM).* University of Economics-Varna, pp. 106 – 122. DOI: 10.56065/HRM/2026.106

## 1. Introduction

Contemporary scientific literature emphasizes employee engagement as one of the factors for measuring organizational effectiveness and achieving sustainable development. Research focused on labor market transformations shows that digitalization and the emergence of new professions require continuous development of competencies, which directly affects employee motivation and engagement (Ivanova, 2021). In this context, engagement can be seen as a way for employees to adapt to the changing requirements of the work environment, especially in the context of technological and organizational changes.

...

Some authors emphasize the role of human resource management in stimulating engagement. The implementation of modern management practices oriented towards motivation, participation and organizational support are identified as a prerequisite for higher satisfaction and organizational loyalty (Andreeva and Asenov, 2023; Marinova and Barbov, 2022). In this sense, employee engagement is viewed not only as an individual psychological state, but also because of targeted management policies, digitalized human resource (HR) processes, and organizational culture development.

A significant aspect in the literature is the participation of employees in decision-making processes. Research shows that staff involvement increases the sense of belonging and enhances people's behavioral and emotional engagement in the workplace (Drab-Kurowska and Ivanova, 2024). This understanding expands the traditional approach to measuring engagement by including indicators related to participation, autonomy, and organizational identification, which are increasingly integrated into modern human capital analysis platforms.

Another important focus in scientific research is the relationship between engagement, job satisfaction, and organizational effectiveness. Some authors emphasize that engaged employees demonstrate higher productivity, stronger loyalty, and contribute to the achievement of the strategic goals of the organization (Andreeva and Yolova, 2022; Narleva et al., 2023). This places engagement at the center of empirical models for assessing work behavior and work results (Stanimirov, 2020; Stanimirov, 2015).

Organizational culture and social environment are also identified as key determinants of engagement. A positive organizational environment, trust and a supportive environment stimulate the active participation of employees and strengthen their mental identification with the organization (Koleva, 2023). These findings support the need to include cultural and social indicators when measuring engagement, especially in digital systems for monitoring the employee experience. Also, understanding that improving employee well-being and development opportunities is important when using the potential of modern organizations (Budziewicz-Guzlecka and Antonova, 2024; Dobrev, 2024).

Alongside theoretical models, literature increasingly focuses on the role of information systems and analytical tools in human resource management. Data analysis from applicant tracking systems reveals the potential of HR information systems to provide structured indicators that indirectly influence engagement, such as the quality of selection, recruitment, onboarding and retention of employees (Peicheva, 2022). In parallel, research on the design and architecture of complex information systems highlights the importance of flexible data structures and analytical capabilities in the development of platforms for measuring organizational and behavioral indicators (Bankov, 2024). In a broader context, other publications lay the foundations for an interdisciplinary approach that integrates technology, data and human resource management as interconnected elements of modern organizational systems (Sulova, 2021). This development creates the prerequisites for perceiving engagement as a measurable and manageable variable, supported by digital tools and analytical models.

Based on the above, it can be argued that there is a need to form a comprehensive conceptual framework in which employee engagement is viewed as a multidimensional construct, encompassing various aspects – motivational, behavioral, emotional, organizational. Such an approach will provide a solid theoretical and methodological basis for developing empirical tools and platforms for analyzing and managing engagement in modern organizations. In this sense, **the aim of the study** is to analyze the leading thematic directions and methodological approaches in its measurement in scientific literature. The objectives of the study are:

- To identify and systematize the key concepts, dimensions and methodological approaches for analyzing employee engagement through automated text and network analysis of scientific publications.
- To assess the potential for application of the results in developing systems and platforms for measuring and managing employee engagement in an organizational context.

The study is limited to the analysis of a selected corpus of scientific publications, which does not permit a comprehensive generalization of all existing approaches and industry-specific details. Automated text analysis, TF-IDF, network analysis, and clustering methods were used to identify key concepts and relationships between them. The results show a dominant role in job satisfaction, organizational support and well-being as the main dimensions of engagement in human resource management.

## 2. Literature Review

### 2.1. Employee Engagement Metrics

In scientific literature, various metrics have been studied and proposed to measure employee engagement. For example, the Employee Engagement Score is a widely used metric, but some authors emphasize that the lack of a generally accepted and validated measurement scale leads to conceptual differences and limited comparability of results between studies (Khodakarami, Dirani and Rezaei, 2018). This necessitates the use of instruments that cover different dimensions such as emotional, cognitive and behavioral aspects of engagement, to ensure higher validity of the Employee Engagement Score (ibid.). Practical research shows that measuring engagement at the individual level is critical, as it has a direct relationship with employee performance and retention and should not be analyzed solely through aggregated organizational indicators (Hayes and Buckingham, 2020).

Other studies analyze the differences between the Employee Satisfaction and Employee NPS metrics (also spelled Employee Net Promoter Score – eNPS), emphasizing that organizations are evolving from measuring satisfaction to measuring engagement and increasingly towards eNPS, which shows not only the degree of satisfaction, but also the tendency of employees to recommend their employer as a good place to work (Yaneva, 2018). The author argues that eNPS serves as an indicator of loyalty and engagement, which goes beyond passive attitudes and is oriented towards active support of the organization (ibid.). On the other hand, Sedlak (2020) points out that based on the recommendations that employees make to their acquaintances and friends about the companies they work for, one can judge their job satisfaction and potentially their engagement. The author emphasizes that the popularity of this one-step indicator is due to its easy applicability, which makes it a useful tool for quickly assessing working relationships (Sedlak, 2020).

Other papers have suggested that organizational commitment and employee well-being are interrelated, with employee profiles being linked to their engagement (Stark, Smith and Carter, 2025). According to the authors, employees can be differentiated by their level of psychological attachment and emotional well-being (ibid.). The study uses so-called “latent profiles” to demonstrate that higher levels of organizational commitment often correlate with better mental health and a general sense of well-being among employees (ibid.). Other studies have shown that engagement is positively associated with both staff retention and reduced stress and depressive symptoms, highlighting the importance of engagement not only as a management metric but also as an indicator of individual well-being (Carneiro and Bastos, 2024). This suggests that engagement measurement systems and platforms should include indicators of mental and emotional state, as they provide a more complete picture of the relationship between engagement, satisfaction, and employee health (Murphy, 2024).

Other authors are of the opinion that metrics related to the behavioral aspects of employees play a key role in interpreting engagement in an organizational context, such as the "Turnover intention" metric, which is established as one of the strongest indicators of low engagement (Osta, 2025). The "absenteeism rate" metric is considered an objective behavioral indicator that reflects both engagement and the quality of HR practices, especially in hybrid and remote work environments (Verma and Sinha, 2025). Another paper mentions the so-called "retention rate", which measures the actual retention of employees and is directly linked to sustainable engagement and well-being, with more engaged employees demonstrating longer-term attachment to the organization (Nisa and Utama, 2025). From a business performance perspective, some authors consider "productivity proxy metrics" that serve as indirect indicators of engagement, as they establish a positive relationship between engagement, efficiency and organizational performance (Labus and Nikolić, 2025). On the other hand, behavioral metrics such as "participation rate" and "feedback frequency" complement the set of indicators by reflecting the active involvement of employees in organizational processes and communication, although they do not capture the depth of engagement in themselves (Wu, Zhao and Fils-Aime, 2022; Pichler, Beenen and Wood, 2018). "Sentiment score" metrics based on text data analysis are also increasingly widely used, which allow identifying the emotional tone and hidden attitudes of employees beyond standard survey questions (Niedbał, 2024). They are often used in combination with so-called "employee journey touchpoint scores", which provide a contextualized assessment of key moments of the

employee experience, such as onboarding and performance appraisal, and help understand how specific organizational interactions influence engagement dynamics (Neelima and Chandrika, 2025).

Based on the literature review above, we summarized all the metrics mentioned in Table 1.

**Table 1**

**Employee Engagement Metrics Comparison**

| Metric | Purpose | Data type | Method | Pros | Cons |
|---|---|---|---|---|---|
| **Employee Engagement Score** | Emotional, cognitive, and behavioral engagement | Subjective (self-reported attitudes) – employees evaluate their own experience | Multi-question, validated surveys | Multidimensional; strong theoretical basis | Susceptible to social desirability |
| **Employee Net Promoter Score (eNPS)** | Loyalty and willingness to recommend | Subjective (evaluative opinion) – one-time personal assessment | Single-question survey | Fast; easy to compare | Low diagnostic depth |
| **Job Satisfaction Score** | Job satisfaction | Subjective (affective assessment) – personal feeling of satisfaction | Surveys | Stable and well-researched | Does not measure active engagement |
| **Organizational Commitment** | Psychological attachment | Subjective (psychological attitude) – identification with the organization | Validated psychometric scales | Predictor of retention | Partial overlap with engagement |
| **Work Motivation Index** | Intrinsic and extrinsic motivation | Subjective (motivational orientations) – perceived motives | Surveys | Explains reasons for engagement | Contextual dependent |
| **Employee Well-being Index** | Mental, physical and emotional state | Subjective (self-assessment of well-being) | Surveys, self-report instruments | Linked to sustained engagement | Indirect link to performance |
| **Turnover Intention** | Turnover intention | Subjective (declared intention) – cognitive assessment of future behavior | Surveys | Early indicator of risk | Social desirability |
| **Absenteeism Rate** | Absenteeism | Objective (administrative records) – recorded facts | HRIS / payroll systems | Opinion-independent | Multifactorial cause |
| **Retention Rate** | Employee retention | Objective (actual behavior) – actual stay/leave | HRIS data | Long-term validity | Responds with delay |
| **Productivity Proxy Metrics** | Indirect productivity | Objective (operational indicators) – measurable results | KPI, system logs | Links engagement to business outcomes | Difficult causal relationship |
| **Participation Rate (surveys)** | Activity and involvement | Behavioral (observable action) – participation in a process | Survey platforms | Easy and comparable | Does not indicate quality |
| **Feedback Frequency** | Feedback frequency | Behavioral (frequency of actions) – recorded interactions | HR/EX platforms | Culture indicator | Depends on process design |

| Metric | Purpose | Data type | Method | Pros | Cons |
|---|---|---|---|---|---|
| **Sentiment Score** | Emotional tone | Textual (linguistic data) – free text analysis | NLP / text analytics | Captures nuances | Algorithmic opacity |
| **Employee Journey Touchpoint Scores** | Key moment experience | Subjective (contextual self-assessment) | Lifecycle surveys | High contextual accuracy | Fragmentation |

*Source: Author's Compilation.*

It can be argued that the subjective metrics included in Table 1, such as Employee Engagement Score, job satisfaction, and organizational commitment, offer interpretive value and a strong theoretical basis, but are vulnerable to socially biased responses. Objective indicators, such as turnover, absenteeism, and productivity, provide reliability and independence from employee attitudes, but respond with a delay and are often dependent on many factors. Behavioral indicators, including survey participation and feedback frequency, complement these two groups of metrics by observing actual actions, but do not always reflect the depth or quality of employee engagement. Metrics based on text and language analysis, such as sentiment scores, reveal nuances in the emotional state of employees, but require careful interpretation due to the algorithmic opacity of the tools that use them. Data on employee well-being and motivation outlines engagement as a sustainable state, rather than a momentary reaction, which highlights the need for long-term HR monitoring. It can be argued that reliably measuring engagement requires an integrated approach that combines different types of metrics to achieve a balanced and valid assessment.

### 2.2. Employee Engagement Platforms

The metrics studied in the contemporary HR literature for measuring employee engagement are increasingly integrated into digital platforms that combine surveys, analytics, artificial intelligence, and big data. In this context, HR platforms can be seen not only as technological solutions, but also as the implementation of theoretical models of engagement, well-being, and organizational behavior. For example, the Qualtrics platform is positioned as a tool with high methodological validity, as it is widely used in academic and applied research on employee experience and engagement, including analyses of reasons for engagement and its relationship to turnover intentions and well-being (Black, Ganshorn, and Wheeler, 2023). Another practical engagement measurement platform is Culture Amp, which focuses on leveraging engagement data through intuitive interfaces, pulse surveys, and driver analysis, with some research showing that frequent feedback and the inclusion of engagement and well-being metrics have a positive effect on employee engagement and retention (Culture Amp, 2025). The Lattice platform (2025) integrates engagement measurement with performance management, goals, and feedback, based on creating people-first cultures, the notion that employee development matters is expected.

Workvivo (2025) is another HR platform that focuses on the social and communicative dimensions of engagement by managing Employee internal communications, such as traditional top-down communications like corporate newsletters or emails, and more modern, worker-focused techniques like employee listening, feedback loops, and peer-to-peer recognition. Despite the limited measurement scales, the platform contributes to increasing insights into behavioral engagement and employee participation in company communication channels.

Another integrated HR platform, Workday, allows for the measurement of engagement in the context of the entire employee lifecycle by offering indicators related to baseline employee needs, including fair compensation, growth opportunities, and clearly defined goals, which are the key to an engaged workforce—but business leaders will need to consider (Workday, 2024).

Microsoft Viva (2023) is another widely known platform that presents employee engagement by integrating wellbeing, learning, and AI-based insights into the everyday digital work environment, which also reflects contemporary research on the role of mental health and personalized support for sustainable engagement (Bohlmeijer and Westerhof, 2021; Jesuthasan, Low, and Ong, 2022). Although scientific metrics are more limited, the low threshold for implementation and strong ecosystem integration make it a practical

solution for continuous engagement monitoring (Schirpke et al., 2023; Cociorva, Onofrei and Vîlcea, 2023). Table 2 systematizes comparative data on employee engagement measurement platforms.

Based on the literature review above, we summarized all the mentioned platforms in Table 2.

**Table 2**

**Employee Engagement Platforms Comparison**

| Criteria / Platform | Qualtrics | Culture Amp | Lattice | Workvivo | Workday | Microsoft Viva |
|---|---|---|---|---|---|---|
| License | Enterprise, on-demand | Per-employee | modular | per-user | Enterprise; bundle with HCM | Included in Microsoft 365 |
| Core Features | Surveys, EX analytics, action planning | Engagement, feedback, performance | Goals, reviews, feedback, surveys | Communication, recognition, community | EX within HCM | Wellbeing, learning, insights |
| Engagement Metrics | eNPS, engagement index, driver analysis | Engagement score, inclusion, wellbeing | Engagement, performance, OKRs | Engagement, participation | Engagement, retention | Engagement, wellbeing |
| HRIS Integration | Yes (Workday, SAP, etc.) | Yes (Workday, BambooHR) | Yes (ADP, Rippling) | Partially (API) | Native HRIS | Yes (ecosystem) |
| AI Integration | Yes (text & predictive analytics) | Yes (AI comment analysis) | Yes (AI insights) | Limited | Yes (ML analytics) | Yes (Copilot) |
| Gamification | Limited | Limited | No | Yes (badges, recognition) | No | Limited |
| Integration with Other Products | ERP, CRM, BI, collab tools | Slack, MS Teams | Slack, Jira | Teams, Slack, Zoom | ERP, Finance | Teams, Outlook |
| Digital Accessibility | Web, mobile, WCAG | Web, mobile | Web, mobile | Mobile-first | Web, mobile | Web, mobile, accessibility-first |
| Pros | High methodological validity; deep analytics; suitable for scientific research | Intuitive UX; strong focus on engagement; quick interpretation | Good integration between performance and EX; easy to implement | Strong social dynamics; high engagement | Single platform for the entire HR lifecycle | Low threshold for implementation; strong integration with M365 |
| Cons | High cost; complexity; requires expertise | More limited analytical depth | Weaker psychometric validity | Limited measurement scales | Less flexibility; heavy implementation | More limited scientific metrics |

*Source: Author's Compilation.*

According to the data in Table 2, it can be argued that the platforms differ significantly in depth of analysis, degree of integration, and applicability for scientific and business purposes. Solutions such as Qualtrics and Culture Amp stand out with higher methodological and psychometric validity, which makes them suitable for in-depth analyses of engagement, but require greater financial and expert resources. Platforms such as Lattice and Workvivo place a stronger emphasis on continuous feedback, social dynamics, and the daily experience of employees, at the expense of more limited analytics. Integrated solutions such as Workday and Microsoft Viva offer the advantage of a comprehensive view of the employee lifecycle and easier implementation in existing ecosystems. The presence of AI functionalities in most platforms shows a clear trend towards automated analysis of text data and prediction of engagement, although the degree of

transparency and scientific validity still needs to be improved. The limited use of gamification in most solutions suggests a cautious approach to game elements in the context of serious HR measurements. Therefore, the choice of platform should be consistent with the goals of the organization – whether the priority is scientific validity, rapid interpretation, social interaction or technological integration. In this regard, effective measurement of engagement requires conducting additional research into scientific literature and deriving theoretical propositions in the field of employee engagement.

## 3. Methods

Figure 1 shows the sequence of steps in which we experiment with this study.

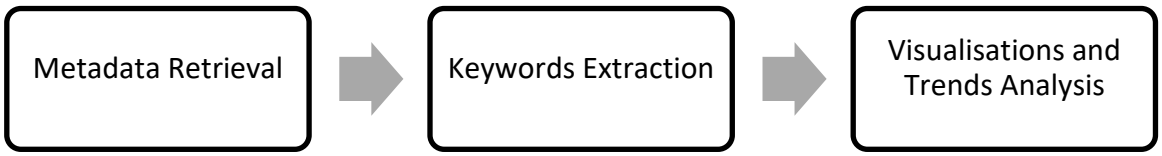



**Fig. 1. VOS Viewer Results of Retrieving Metrics-related Keywords**

*Source: Own Elaboration.*

**Stage 1**. **Metadata Retrieval:** The first stage involves collecting metadata (e.g., article title, abstract, author keywords) from relevant sources of scientific or professional information. Metadata typically contains titles, abstracts, keywords, author names, year of publication, journal or source, and bibliographic identifiers. The goal of this stage is to build a corpus of textual data that can serve as a basis for subsequent analysis. Sources can include scholarly databases (e.g., Scopus, Web of Science), institutional repositories, or specialized digital libraries.

**Stage 2. Keywords Extraction:** The second stage focuses on identifying and extracting terms and concepts from the retrieved corpus. This can be accomplished using automated methods, including natural language processing (NLP) techniques. Keyword mining aims to uncover the most common themes, research directions and conceptual dependencies in the analyzed metadata set. In this stage, filters for frequency, relevance and semantic value, as well as term normalization can be applied. The resulting list of keywords serves as a basis for conducting the next stage.

**Stage 3. Visualizations and Trends Analysis:** The final stage is aimed at graphically presenting the extracted keywords and their interrelationships. Visualization supports the interpretation of the results by presenting frequencies, clusters, co-occurrence networks or hierarchical structures. This stage aims to facilitate the identification of major thematic clusters of research areas and relationships between concepts that would be difficult to recognize through tabular data. Based on the visualizations of the key phrases, an analysis of the detected trends in the text is also performed.

## 4. Results and Discussion

In the first stage of the research process "Metadata Retrieval" we extract metadata in English from Scopus using the key phrases "Employee Engagement Metrics", "Employee Engagement Platforms" and "Employee Engagement Software". In the first query, titles, abstracts and author keywords of 310 publications were retrieved. In the second phrase, 553 metadata records were retrieved, and in the third – 606 metadata records. A local repository of text information was formed, which is used as a basis for conducting the next stage of the research.

In the second stage "Keywords Extraction" we create a script that uses NLP techniques to process metadata from the local repository. Pseudocode of the script is added as Appendix 1. The pseudocode is independent of a specific programming language and visualizes the algorithm by which natural language processing was performed. The algorithm is implemented in the Python programming language, which implements some specialized libraries for machine learning, regular expression processing, etc.:

- pandas is a Python library for processing, analyzing, and structuring tabular data using objects such as DataFrame and Series (NumFOCUS, 2026).
- glob allows automatic search and loading of files using templates, which facilitates processing multiple files simultaneously (DevCademy Media, 2026a).
- re provides tools for working with regular expressions and is used for searching, cleaning, and extracting text patterns (DevCademy Media, 2026b).
- collections contains specialized data types (such as Counter and defaultdict) that facilitate efficient counting and grouping of elements (Python Software Foundation, 2026a).
- nltk is a natural language processing library used for tokenization, lemmatization, and text content analysis (Python Software Foundation, 2026b).
- sklearn (scikit-learn) provides machine learning algorithms, including classification, clustering, and feature extraction from data (Python Software Foundation, 2026c).
- networkx is a library for creating, analyzing, and visualizing networks and graphs, including social and semantic networks (Python Software Foundation, 2026d).
- matplotlib is a module for creating graphs and data visualizations, such as charts, histograms, and line graphs (Python Software Foundation, 2026e).
- wordcloud is used to visualize the frequency of words in text using word clouds (Python Software Foundation, 2026f).
- community (python-louvain) is a library for discovering communities in networks, most often using the Louvain algorithm for modularity (NetworkX Developers, 2025).

In general, the algorithm in Appendix 1 aims to extract, structure, and visualize key multi-word concepts from multiple text documents, using TF-IDF analysis to assess their significance. By cleaning and normalizing the texts, noise is reduced and meaningful phrases are more reliably detected. The resulting key expressions are organized hierarchically by main concepts and exported in a tabular form for subsequent analysis. Word cloud and network graph visualizations with discovered communities help interpret the thematic structure and relationships between concepts. The results are also exported as a CSV file containing the identified top 100 key phrases in the metadata from the local repository and their weight according to the TF-IDF analysis. The formed set of key phrases is used in the next stage of the research process.

At the last stage "Visualizations and Trends Analysis" we visualize the distribution of the extracted key phrases. Fig. 2 shows the top 55 key phrases identified by the Python script developed according to the algorithm from Appendix 1, as well as their values according to the TF-IDF analysis. The dominant role of the topic "human resource management", which has the highest relative weight, is clearly highlighted. Concepts such as "structural equation modeling", "partial least squares" and SEM have a clearly expressed presence, which indicates that the research in the corpus is methodologically oriented and often uses quantitative models to analyze the relationships between variables. Topics such as "employee engagement", "job satisfaction", "perceived organizational support" and "work-life balance" outline the focus on the behavioral attitudes and aspects of employees. The presence of phrases related to "organizational citizenship behavior" and "corporate social responsibility" suggests an interest in the broader social and organizational context of employee engagement in the workplace. It can be said that the results of the analysis of the identified key phrases extracted from the Scopus metadata show that employee engagement is viewed as a multidimensional phenomenon, analyzed through established management and statistical approaches.

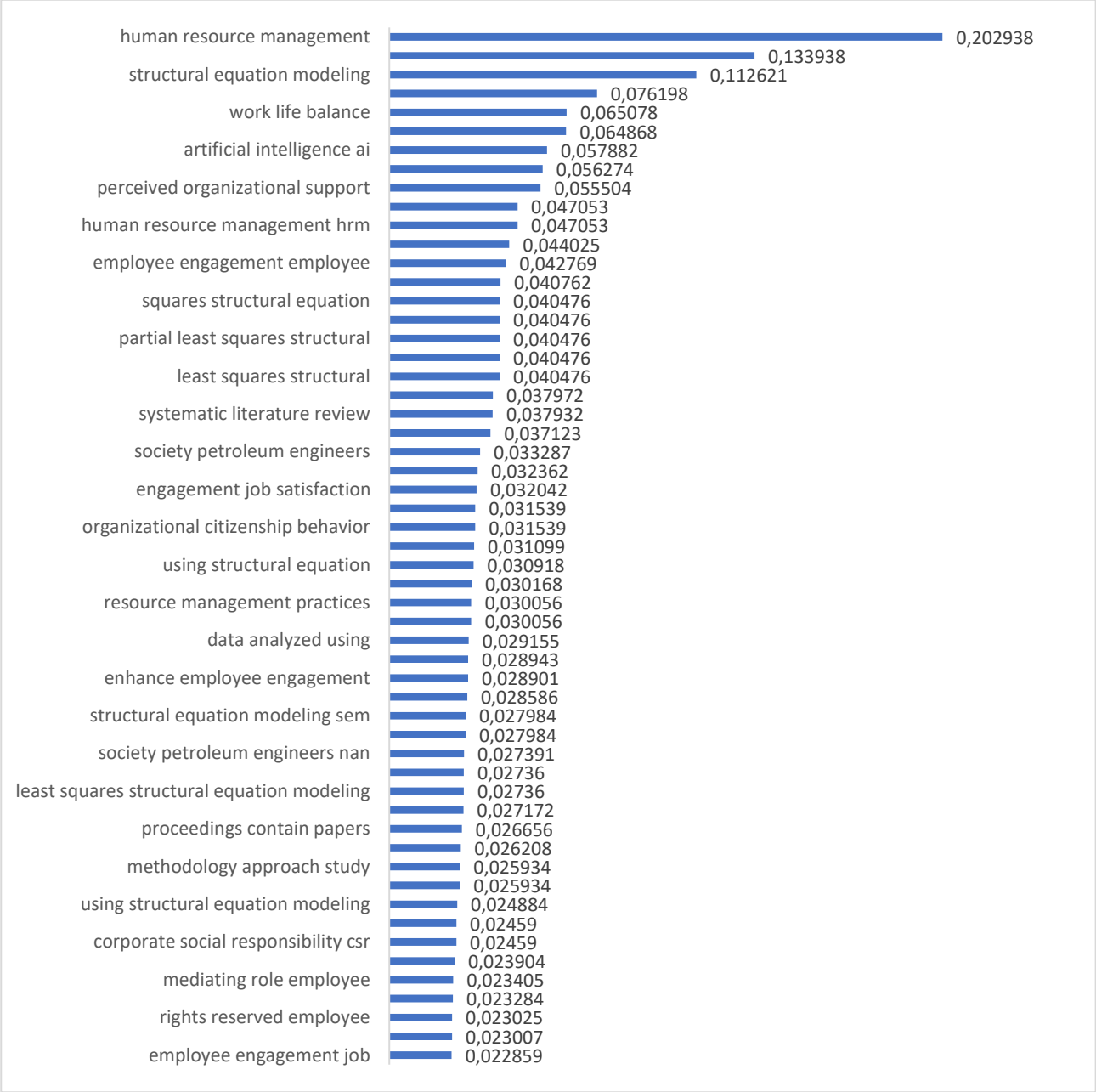



**Fig. 2. Top 55 Extracted Key Phrases**

*Source: Own Elaboration.*

Fig.3 presents a cluster visualization of scientific concepts related to the key phrase "Employee Engagement Metrics", which were analyzed by VOSViewer from the metadata downloaded from Scopus.

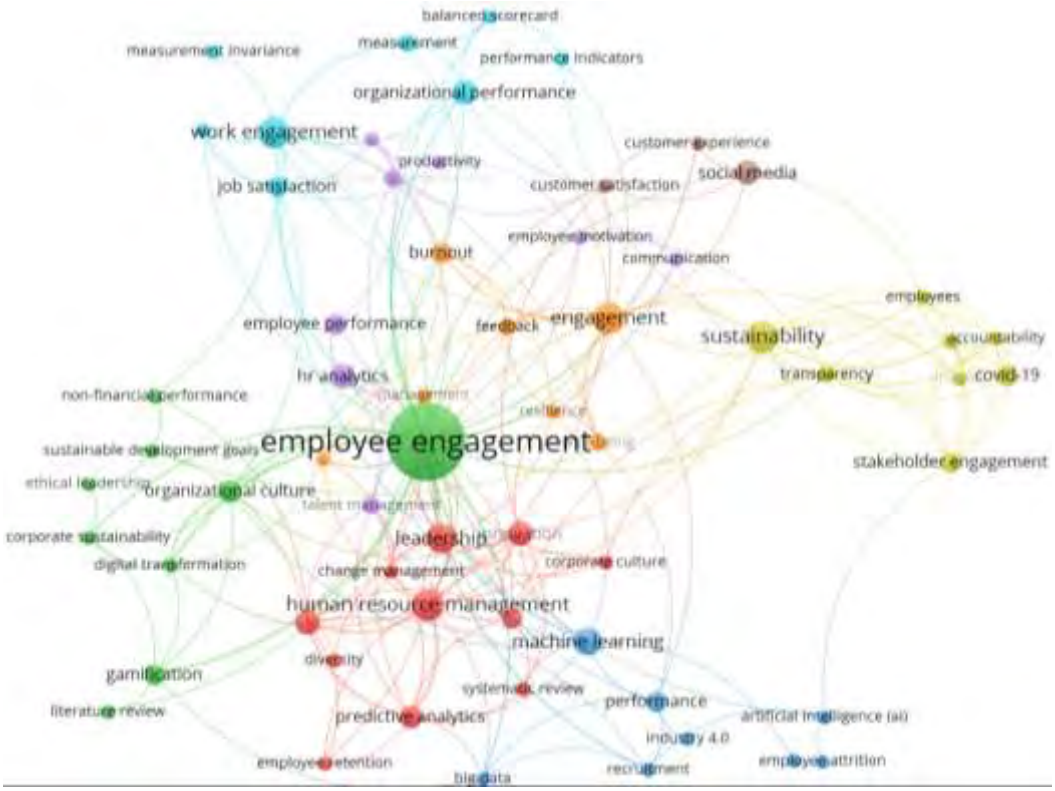



**Fig. 3. VOS Viewer Results of Retrieving Metrics-related Keywords**

*Source: Own Elaboration.*

The phrase “employee engagement” is the most prominent central node. Around it are grouped thematic clusters that unite key areas such as human resource management, leadership, organizational culture, sustainability and employee performance. The connections between the nodes indicate the frequency of joint use of the concepts in scientific literature, which reveals the interdisciplinary nature of the topic of this paper. One of the clusters emphasizes technological approaches, including machine learning, artificial intelligence, big data and predictive analytics, applied in the HR context. Other clusters emphasize the importance of factors such as job satisfaction, motivation, burnout and work engagement in the context of organizational performance. The presence of concepts related to sustainability, transparency, and stakeholder engagement indicates an expansion of focus beyond the internal organization of the workplace. Overall, the visualization of the metadata of scientific publications synthesizes achievements in the field of employee engagement, which is an intersection between management, social, and technological research directions.

Fig.4 presents a cluster visualization of scientific concepts related to the key phrases "Employee Engagement Platforms" and "Employee Engagement Software", which were analyzed by VOSViewer from the metadata downloaded from Scopus. The visualization in Fig. 4 presents the conceptual ecosystem of employee engagement in organizations, with the phrases "employee engagement" and "work engagement" occupying central positions in the system of concepts. This suggests that engagement measurement platforms should be built around these cores and integrate multiple interrelated dimensions. The connection with concepts such as "job satisfaction", "organizational commitment" and "employee performance" shows the need for systems to combine indicators related to employee behavior, attitudes and performance measurements in the workplace. The clusters related to "well-being", "mental health", "burnout" and "stress" highlight the importance of having well-being monitoring modules in digital engagement platforms.

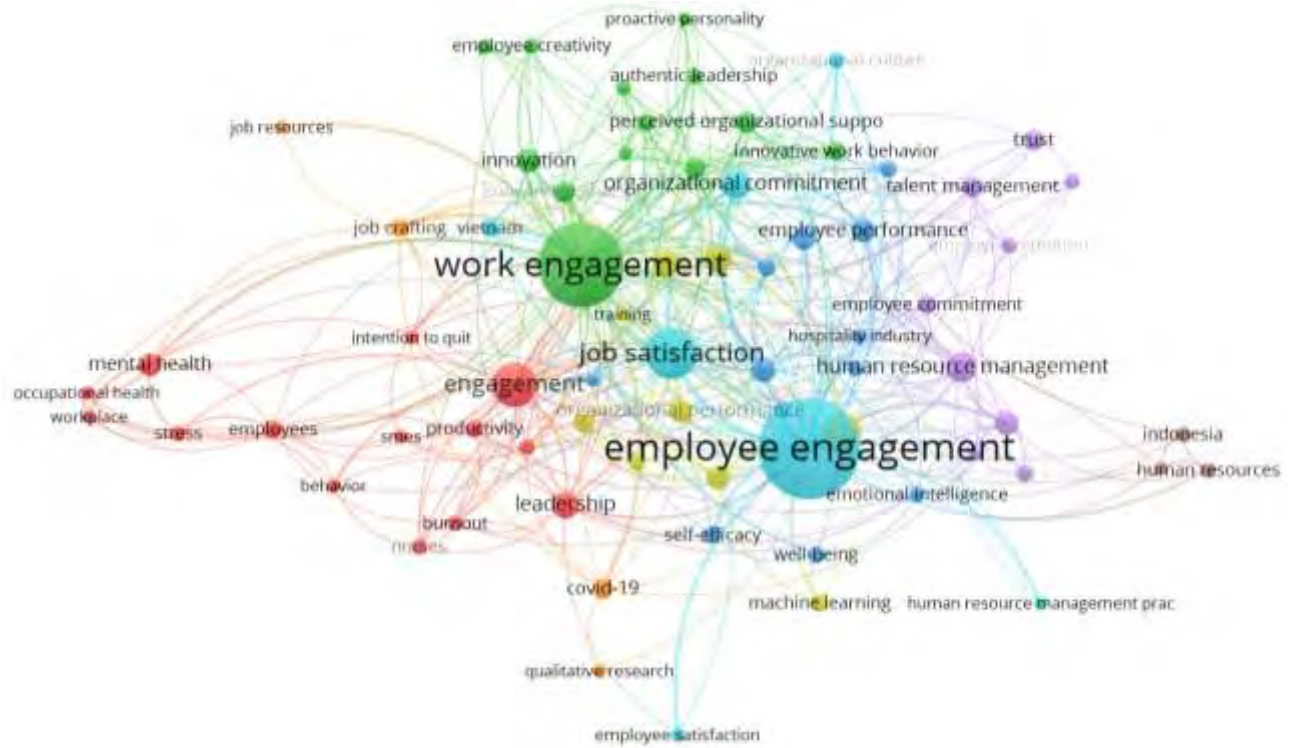



**Fig. 4. VOS Viewer Results of Retrieving Platforms-related Keywords**

*Source: Own Elaboration.*

The presence of technology-oriented key phrases in Fig. 4 such as "machine learning" and "human resource management practices" suggests the potential for using intelligent algorithms for personalized engagement measurement and prediction. The links to "leadership", "authentic leadership" and "perceived organizational support" emphasize the need for platforms to capture managerial and cultural factors. The themes of "trust", "talent management" and "employee retention" show that employee engagement measurement systems have a strategic role in employee retention and talent management in organizations. It can be said that the results of processing the metadata dataset targeting employee engagement measurement systems and platforms support the concept of engagement platforms as complex systems that integrate data from different organizational, behavioral, and technological sources.

## 5. Conclusion

In conclusion, the research conducted shows that employee engagement is a complex, multidimensional network of constructions, which is formed under the influence of individual, organizational, and managerial factors. The analysis of the scientific literature and the key concepts extracted confirm the important role of human resource management, job satisfaction, and organizational support as the main determinants of employee engagement in the workplace. The results of the text analysis show that modern research increasingly uses quantitative methods and structural models to explain the relationships between engagement, performance, and employee well-being. There is a clear trend towards integrating indicators of mental health, well-being, and work-life balance in the assessment of engagement. At the same time, the inclusion of technological approaches, such as machine learning and network analysis, reveals the potential for the development of intelligent systems and platforms for measuring and predicting engagement. As an opportunity for future research, we would point out the need to explore the prospects for introducing a systematic and interdisciplinary approach to analyzing and managing employee engagement, which would combine theoretical models, empirical data, and digital tools to support sustainable organizational development.

**Appendix 1. Pseudocode for TF-IDF-Based Keyword Phrase Extraction and Network Clustering**

```
BEGIN
import pandas as pd
import glob
import re
from collections import defaultdict
import nltk
from nltk.corpus import stopwords
from sklearn.feature_extraction.text import TfidfVectorizer
import networkx as nx
import matplotlib.pyplot as plt
from wordcloud import WordCloud
import community as community_louvain

SEQUENCE
 Initialize input folder and parameters
 Set TOP_N = 100
 Set NGRAM_RANGE = (3,5)
 Initialize empty list DOCUMENTS
END SEQUENCE

FOR each CSV_FILE in input folder DO
 IF CSV_FILE is readable with standard encoding THEN
 Read CSV_FILE
 ELSE
 Read CSV_FILE ignoring encoding errors
 ENDIF
 Convert all fields to text
 Append concatenated text to DOCUMENTS
ENDFOR

FOR each DOCUMENT in DOCUMENTS DO
 Convert text to lowercase
```

```
 REPEAT
 Remove URLs and DOI identifiers
 Remove non-alphabetic characters
 Normalize whitespace
 UNTIL text contains no noise
 Store cleaned DOCUMENT
ENDFOR

CASE token_type OF
 URL, DOI, punctuation : remove token
 alphabetic : keep token
ENDCASE

SEQUENCE
 Initialize TF-IDF vectorizer
 Set stopwords to English list
 Set n-gram length to 3–5 words
 Apply TF-IDF to all DOCUMENTS
END SEQUENCE

Compute mean TF-IDF score for each keyword phrase
Sort phrases by TF-IDF score (descending)
Select TOP_N phrases

SEQUENCE
 Initialize empty HIERARCHY and RESULTS table
END SEQUENCE

FOR each SELECTED_PHRASE DO
 Extract ROOT keyword (first word)
 IF ROOT not in HIERARCHY THEN
 Create ROOT entry
 ENDIF
 Add phrase and TF-IDF score under ROOT
```

```
 Add record to RESULTS table
ENDFOR

Sort RESULTS by ROOT and TF-IDF score
Export RESULTS to CSV

SEQUENCE
 Generate word cloud weighted by TF-IDF scores
 Save word cloud as PNG
END SEQUENCE

SEQUENCE
 Build network GRAPH from HIERARCHY
 Apply Louvain clustering
END SEQUENCE

WHILE iterating through GRAPH nodes DO
 IF node is ROOT THEN
 Assign larger node size
 ELSE
 Assign node size proportional to TF-IDF score
 ENDIF
ENDWHILE

SEQUENCE
 Compute graph layout
 Color nodes by cluster membership
 Export graph as PNG and GEXF
END SEQUENCE
END
```

**Acknowledgments**

The author expresses her gratitude to the Bulgarian Scientific Research Fund, Ministry of Education and

Science of Bulgaria for the support provided in the implementation of the project "Impact of digitalization on innovative approaches in human resources management", Grant No. BG-175467353-2022-04/12-12-2022, contract No. KP-06-H-65/4 – 2022. The author has no conflicts of interest to disclose.

**References**

1. Andreeva, A., Asenov, O. (2023) Electronic Competence Passport – A Step Towards a New Generation of Quality Work Process. Journal „Човешки ресурси & Технологии = HR & Technologies“, Creative Space Association, 1, pp. 6 – 24.

2. Andreeva, A., Yolova, G. (2022) Employment And Social Security Aspects Of Platform Working – Challenges And Possible Legislative Solutions. Journal „Човешки ресурси & Технологии = HR & Technologies“, Creative Space Association, 2, pp. 35 – 52.

3. Bankov, B. (2024) Clinical trial management system design and data structure. Journal “Човешки ресурси & Технологии = HR & Technologies”, Creative Space Association, 1, pp. 6 – 20.

4. Black, M., Ganshorn, H. and Wheeler, J. (2023) 'Using Qualtrics XM to create a Point-of-Use survey to assess the usability of a local implementation of Primo,' Information Technology and Libraries, 42(4). https://doi.org/10.5860/ital.v42i4.16475.

5. Bohlmeijer, E. and Westerhof, G. (2021) 'The Model for Sustainable Mental Health: Future Directions for Integrating Positive Psychology into Mental Health care,' Frontiers in Psychology, 12, p. 747999. https://doi.org/10.3389/fpsyg.2021.747999.

6. Budziewicz-Guźlecka, A., Antonova, K. (2024) Digitalization as an Element of Development and Challenges in the Tourism Sector. Journal “Човешки ресурси & Технологии = HR & Technologies”, Creative Space Association, 2, pp. 17 – 31.

7. Carneiro, L.L. and Bastos, A.V.B. (2024) Organizational commitment and well-being at work: investigating alternative models of association. CES Psicología, 17(1), pp. 1–16. https://doi.org/10.21615/cesp.7076.

8. Cociorva, A., Onofrei, N. and Vîlcea, A.-L. (2023) 'Tool integrations for monitoring solutions and associated performance analysis,' Proceedings of the ... International Conference on Business Excellence, 17(1), pp. 1929–1943. https://doi.org/10.2478/picbe-2023-0170.

9. Culture Amp. (2025) Research July 2025 Emerging Benchmark status. [online] Available at: https://www.cultureamp.com/science/insights/research [Accessed 10 January 2026]

10. DevCademy Media. (2026a) glob. [online] Available at: https://docs.python.org/3/library/glob.html [Accessed 10 January 2026]

11. DevCademy Media. (2026b) re. [online] Available at: https://realpython.com/ref/stdlib/re/ [Accessed 10 January 2026]

12. Dobrev, D. (2024). Impossible Leadership. Journal “Човешки ресурси & Технологии = HR & Technologies”, Creative Space Association, 2, pp. 6 – 16.

13. Drab-Kurowska, A., Ivanova, P. (2024) Green Competence and Business Needs – an Analysis Based on the Example of Poland. Journal “Човешки ресурси & Технологии = HR & Technologies”, Creative Space Association, 2, pp. 42 – 54.

14. Engagement. Full Research Report. [online] Available at: https://www.adpresearch.com/wp-content/uploads/2020/07/R0110_0520_v5_DSEE_ResearchReport.pdf [Accessed 10 January 2026]

15. Hayes, M., and Buckingham, M. (2020) The Definitive Series: Employee

16. Ivanova, M. (2021) New Professions On The Laber Market. Journal “Човешки ресурси & Технологии = HR & Technologies”, Creative Space Association, 2, pp. 30 – 40.

17. Jesuthasan, J., Low, M. and Ong, T. (2022) 'The Impact of personalized Human support on engagement with behavioral intervention Technologies for employee Mental Health: an Exploratory retrospective study,' Frontiers in Digital Health, 4, p. 846375. https://doi.org/10.3389/fdgth.2022.846375.

18. Khodakarami, N., Dirani, K. and Rezaei, F. (2018) Employee engagement: finding a generally

accepted measurement scale. Industrial and Commercial Training, 50(6), pp. 305–311. https://doi.org/10.1108/ict-11-2017-0090.

19. Kirechev, D. (2024) Study Of Labour Costs And Labour Productivity On Agricultural Holdings In Bulgaria. Journal "Човешки ресурси & Технологии = HR & Technologies", Creative Space Association, 1, pp. 21 – 47.

20. Koleva, V. (2023) E-recruitment and generation z job seekers. Journal "Човешки ресурси & Технологии = HR & Technologies", Creative Space Association, 1, pp. 63 – 75.

21. Labus, P. and Nikolić, J.L. (2025) The Mediating Role of Employee Engagement in the Relationship Between Organisational Climate and Turnover Intentions: A Study among Hospitality Employees. Journal of East European Management Studies, 30(4). https://doi.org/10.31083/jeems49104.

22. Lattice. (2025) HR's Ultimate Guide to Employee Development. [online] Available at: https://people.lattice.com/rs/372-AAD-485/images/HR%27s%20Ultimate%20Guide%20to%20Employee%20Development.pdf [Accessed 10 January 2026]

23. Marinova, O., Barbov, Z. (2022) Trends And Challenges In Human Resource Provision In The Software Sector In Bulgaria. Journal „Човешки ресурси & Технологии = HR & Technologies", Creative Space Association, 1, pp. 30 – 42.

24. Microsoft Viva. (2023) The People-Powered Workplace. [online] Available at: https://pulse.microsoft.com/wp-content/uploads/2023/11/Microsoft-Viva-Ebook.pdf [Accessed 10 January 2026]

25. Murphy, K.A. (2024) Assessment of Employee Well-Being on Organisational Effectiveness & Productivity: A Literature Review. International Journal of Business and Management, 19(3), p. 26. https://doi.org/10.5539/ijbm.v19n3p26.

26. Narleva, K., Narlev, Y., Gancheva, Y. (2023) Maritime Education and New Skills in the Digitisation Process. Journal "Човешки ресурси & Технологии = HR & Technologies", Creative Space Association, 2, pp. 57-72.

27. Neelima, T. and Chandrika, T.S.P. (2025) A study on HR analytics for attendance patterns and organizational insights. International Journal for Research in Applied Science and Engineering Technology, 13(5), pp. 6909–6914. https://doi.org/10.22214/ijraset.2025.70747.

28. NetworkX Developers. (2025). louvain_communities. [online] Available at: https://networkx.org/documentation/stable/reference/algorithms/generated/networkx.algorithms.community.louvain.louvain_communities.html [Accessed 10 January 2026]

29. Niedbał, R. (2024) Analysis of the employee sentiment as the tool to build positive working environment. Scientific Papers of Silesian University of Technology Organization and Management Series, 204. https://doi.org/10.29119/1641-3466.2024.204.27.

30. Nisa, K.I. and Utama, A. (2025) Understanding employee retention in High-Turnover industries: the role of wellbeing, work engagement, and workplace spirituality. Journal of Business and Management Studies, 7(3), pp. 364–376. https://doi.org/10.32996/jbms.2025.7.3.20.

31. NumFOCUS. (2026) Pandas. [online] Available at: https://pandas.pydata.org/ [Accessed 10 January 2026]

32. Osta, A.M. (2025) The impact of employee engagement on intention to leave in SMEs in Lebanon: the moderating role of normative commitment. Cogent Business & Management, 12(1). https://doi.org/10.1080/23311975.2025.2501208.

33. Pandurska, R. (2022) Research Of The Potential Of Persons Through Human Capital Index. Journal „Човешки ресурси & Технологии = HR & Technologies", Creative Space Association, 2, pp. 16 – 34.

34. Peicheva, M. (2022) Data analysis from the applicant tracking system. Journal "Човешки ресурси & Технологии = HR & Technologies", Creative Space Association, 2, pp. 6 – 15.

35. Pichler, S., Beenen, G. and Wood, S. (2018) Feedback frequency and appraisal reactions: a meta-analytic test of moderators. The International Journal of Human Resource Management, 31(17), pp. 2238–2263. https://doi.org/10.1080/09585192.2018.1443961.

36. Python Software Foundation. (2026a) collections — Container datatypes. [online] Available at: https://docs.python.org/3/library/collections.html [Accessed 10 January 2026]

37. Python Software Foundation. (2026b) nltk 3.9.2. [online] Available at: https://pypi.org/project/nltk/ [Accessed 10 January 2026]

38. Python Software Foundation. (2026c) scikit-learn. [online] Available at: https://pypi.org/project/scikit-learn/ [Accessed 10 January 2026]

39. Python Software Foundation. (2026d) NetworkX. [online] Available at: https://pypi.org/project/networkx/ [Accessed 10 January 2026]

40. Python Software Foundation. (2026e) Matplotlib. [online] Available at: https://pypi.org/project/matplotlib/ [Accessed 10 January 2026]

41. Python Software Foundation. (2026f) word_cloud. [online] Available at: https://pypi.org/project/wordcloud/ [Accessed 10 January 2026]

42. Schirpke, U. et al. (2023) 'Emerging technologies for assessing ecosystem services: A synthesis of opportunities and challenges,' Ecosystem Services, 63, p. 101558. https://doi.org/10.1016/j.ecoser.2023.101558.

43. Sedlak, P. (2020) Employee Net Promoter Score (eNPS) as a Single-item Measure of Employee Work Satisfaction An Empirical Evidence from Companies Operating in Poland. in Wydawnictwo Uniwersytetu Łódzkiego eBooks, pp. 347–357. https://doi.org/10.18778/8220-333-2.21.

44. Stark, H.P., Smith, R.W. and Carter, N.T. (2025) Organizational Commitment Profiles and Employee Well-Being: Exploratory and confirmatory latent profile analyses. Occupational Health Science, 9(3), pp. 639–673. https://doi.org/10.1007/s41542-025-00225-2.

45. Stanimirov, E. (2020) Quo Vadis, Education? In: Proceedings of Jubilee international scientific conference dedicated to the 100th anniversary of the university of economics—varna economic science, education and the real economy: development and interactions in the digital age, Publishing house Science and Economics, vol 1., pp 27–49.

46. Stanimirov, E. (2015) Current Emphases Of The Admission And Training Of Students At The University Of Economics – Varna. Business & Management Compass, University of Economics – Varna, 2, pp. 9-26.

47. Sulova, S. (2021) A Conceptual Model For The Organization And Storage Of Metadata For Data From Internet Sources. Journal "Човешки ресурси & Технологии = HR & Technologies", Creative Space Association, 2, pp. 3 – 14.

48. Todoranova, L., Penchev, B. (2023) Higher Education – Accessible for People with Disabilities. Journal "Човешки ресурси & Технологии = HR & Technologies", Creative Space Association, 2, pp. 45-56.

49. Verma, M.K. and Sinha, A.R. (2025) Assessing the Impact of HRM Practices on Employee Absenteeism with Reference to Remote Employees. International Review of Management and Marketing, 15(6), pp. 68–79. https://doi.org/10.32479/irmm.19548.

50. Workday. (2024) Workday Global Workforce Report. [online] Available at: https://forms.workday.com/content/dam/web/sg/documents/reports/global-workforce-report-v1-en-sg.pdf [Accessed 10 January 2026]

51. Workvivo. (2025). The Ultimate Guide to Internal Comms in Manufacturing. [online] Available at: https://info.workvivo.com/hubfs/Marketing%20-%20Books/The%20Ultimate%20Guide%20to%20Internal%20Comms%20in%20Manufacturing.pdf [Accessed 10 January 2026]

52. Wu, M.-J., Zhao, K. and Fils-Aime, F. (2022) Response rates of online surveys in published research: A meta-analysis. Computers in Human Behavior Reports, 7, p. 100206. https://doi.org/10.1016/j.chbr.2022.100206.

53. Yaneva, M. (2018) Employee Satisfaction vs. Employee Engagement vs. Employee NPS. European Journal of Economics and Business Studies, 4(1), pp. 221–227. https://doi.org/10.2478/ejes-2018-0024.

**SCIENTIFIC FIELD**
**INNOVATIVE APPROACHES IN HUMAN MANAGEMENT**

ISSN (Online): 2815-5084

INTERNATIONAL SCIENTIFIC AND PRACTICAL CONFERENCE ON HUMAN RESOURCE MANAGEMENT
DOI10.56065/HRM/2026.124, pp. 124 – 132

7th edition, 3 October 2025
University of Economics-Varna

# Exploring the potential of social innovations for successful changes towards a fulfilling life and social inclusion of people from risk groups

**Mariya IVANOVA**[1]

[1] Affiliation 1 (Administration and Management), New Bulgarian University, Sofia, Bulgaria, maivanova@nbu.bg

**JEL: J14, J24, E24, M54**

**Abstract**

Social innovations are a leading priority of European research, policies and initiatives. This provoked the author to explore the potential of social enterprises for labor integration in Bulgaria. The report examines social innovations as a way to implement successful changes towards a fulfilling life and social inclusion of people from risk groups. The national context for social entrepreneurship is studied and successful practices of innovative social enterprises for creating the skills sought after on the labor market for people from risk groups and attracting public support for sustainably overcoming the stigma of "difference" and "inferiority" are presented. Data from strategic documents of the EU and Bulgaria, results of projects of the Business Agency Association, National Association of Socially Responsible Employers, Excellia Vocational Training Center and Agency for Social Development – VISION are analyzed. In the research process, positive results with a multiplier effect of developed procedures, methodologies and manuals related to the activities of social enterprises are established. The needs for digital skills in the social enterprise sector for labor integration are studied and identified. As a result, new training and consulting services are being provided to workers in need of support for their transition to the labor market. To develop the potential of innovative social enterprises, the social innovation ecosystem in Bulgaria must rely on its collective expertise. This implies that new training programs should go beyond the framework of training centers and become the subject of teaching in other educational institutions, including universities.

**Published by University of Economics – Varna**

**Key words:**
social enterprise, innovation, good practices, workers in need of support, digital skills.

*Citation:* Ivanova, M. A. (2026). Exploring the potential of social innovations for successful changes towards a fulfilling life and social inclusion of people from risk groups. *Proceedings from 7th International Scientific and Practical Conference on Human Resource Management (ICHRM).* University of Economics – Varna, pp. 124 – 132. DOI: 10.56065/HRM/2026.124

## 1. Introduction

In recent years, social innovations have been among the leading topics and priorities of European practices, research, EU policies, and initiatives. They address numerous key challenges facing modern society, related to economic development, social inclusion, tackling global and local problems, good practices, inspiration for a fulfilling life and work, and more. In Bulgaria, there are social groups that are marginalized or face significant barriers to integration. Innovative social enterprises provide solutions that promote the inclusion of these groups through employment, education, and social services. Social enterprises not only support the socially disadvantaged but also generate economic value. They create sustainable business models that contribute to regional development and economic stability. Furthermore, in the context of climate change, demographic challenges, and social inequalities, innovative social enterprises play an important role in offering sustainable solutions. Examples of successful social enterprises in Bulgaria demonstrate how local initiatives can have a significant positive impact on people's lives. These models serve as inspiration for similar projects in other regions, thus amplifying their effect.

These circumstances prompted the author of this report to explore the potential of social enterprises for labor integration in Bulgaria for creating social innovations. The object of the study is limited to social enterprises for labor integration in the city of Varna, and the subject of the study is the capabilities of these enterprises to create or implement social innovations. We accept social innovations as one of the ways to implement successful changes towards a full life and social inclusion of people from risk groups; to develop new solutions; to encourage cooperation.

To achieve the main research objective, a review of strategic documents of the EU and Bulgaria is made, the national context for social entrepreneurship is analyzed and successful practices from the Varna region of innovative social enterprises for creating work skills in demand on the labor market of people from risk groups are presented, as an opportunity for their long-term social inclusion and attracting public support for sustainably overcoming the stigma of "difference" and "inferiority". The results of activities carried out under projects of the Center for Social Rehabilitation and Integration of Adults at the Business Agency Association, the National Association of Socially Responsible Employers – Bulgaria, the Vocational Training Center at Excelia EOOD, Varna, the Association "Agency for Social Development – VISION", etc. are discussed. In the research process, positive results with a multiplier effect of developed procedures, methodologies and manuals related to the activities of the supported social enterprises are established, taking into account the regional specificities of the Varna region, where the research sites operate.

Innovative approaches to supported employment, sheltered employment and social inclusion have been introduced. Skills needs, in particular in terms of digital skills, in the social enterprise sector for labour integration have been researched and identified. As a result, new training and consultancy services have been developed and provided to workers in need of support for the transition to the real labour market, which are tailored to the constraints of the target group.

## 2. Literature Review

### 2.1. Innovative social enterprise – essence, characteristics and significance in public life

Regulation (EU) 2021/1057 of the European Parliament and of the Council states that: „social enterprise means an undertaking, regardless of its legal form, including a social economy enterprise, or a natural person which: (a) in accordance with its articles of association, statutes or any other legal document which may give rise to liability under the provisions of the Member State in which a social enterprise is located, has as its principal social objective the achievement of a measurable, positive social impact, which may include environmental impact, rather than the generation of profit for other purposes, and provides services or goods that generate a social return, or uses methods of producing goods or services that reflect social objectives; (b) uses its profits primarily to achieve its principal social objective and has established pre-established procedures and rules that ensure that the distribution of profits does not undermine the principal social objective; (c) is managed in an entrepreneurial, participatory, accountable and transparent manner, in particular by involving workers, customers and stakeholders affected by its business activities in its management.[7] In accordance with the EU Regulation, the National Concept for Social Economy of the Republic of Bulgaria states that, "social enterprises may be cooperatives, enterprises and organizations duly registered under national legislation, whose subject of activity has a social and humanitarian outcome and they reinvest profits for social purposes. A social enterprise is a business with leading social objectives, the surplus of which is reinvested back into the business or the community"[8]. In short, a social enterprise is not a project, but a business, i.e. an economic activity that has a dual nature: entrepreneurship with a pronounced social impact [12].

Therefore, a social enterprise is an organization that combines business principles with solving social problems. The main goal of social enterprises is not only to generate profit, but also to create positive change in society. They often provide services or products that help vulnerable groups, promote equality, education or sustainable development. Unlike traditional businesses, social enterprises measure their success not only by economic, but also by social indicators.

Social enterprises often use social innovation to achieve their goals and create sustainable solutions to societal problems.

Social innovation is a sub-type of innovation and differs from business or technological innovation; it has specific stages and phases (from emergence to impact); it is context-defined; it is based on values; it leads to concrete results that are measurable improvements to existing practices; it changes social relations in relation to governance; and it empowers beneficiaries by increasing their socio-political capabilities and access to resources [2]. Social innovation involves new ideas, approaches and models that seek to solve complex social challenges. This may be the creation of a new product, service, process or policy that improves quality of life, social inclusion or access to resources. Social innovation involves new methods of working, managing and understanding that lead to a change in social relations [1]. Social innovation often requires collaboration between different sectors – non-governmental organisations, government institutions and the private sector.

The concepts of social enterprise and social innovation are interconnected. This connection generates serious potential for social inclusion and sustainable development. Social inclusion means creating equal opportunities for all members of society, regardless of their social, economic, ethnic or other affiliation. It seeks to overcome discrimination, marginalization and isolation, enabling people to participate actively in economic, social, cultural and political life. By building communities based on solidarity and equality, social cohesion is strengthened. Social inclusion plays a significant role in reducing poverty and social inequalities, which are often the cause of marginalization; in improving the quality of life of vulnerable groups by providing them with more opportunities for realization. Social enterprises promote social inclusion by providing employment, developing and improving the necessary skills for work, providing access to useful services and products. They offer work to people from marginalized communities, such as people with disabilities, the long-term unemployed or representatives of ethnic minorities. They create services and products that meet the specific needs of vulnerable groups, such as providing access to healthcare or education. They provide training and opportunities to develop professional and social skills that help individuals integrate into society. By organizing events and initiatives, social enterprises connect different social groups, reducing prejudice and building trust.

Therefore, innovative social enterprises are organizations that combine a social mission with an entrepreneurial approach. Their main focus is on solving social or environmental problems through innovative methods. They often offer products or services that not only generate income, but also contribute to positive change in society.

### 2.2. National context for social entrepreneurship

The study of the national context for social entrepreneurship allows us to identify the key factors that influence the manifestations of social enterprises as innovative.

The national context for social entrepreneurship in Bulgaria is shaped by a number of policies, strategies and initiatives that support the development of the social economy.

Historically, the social economy was introduced in Bulgaria through cooperatives and specialized enterprises of people with disabilities. The law that regulates them is the Law on the Integration of People with Disabilities, adopted in 2004 and replaced in 2018 by the new Law on People with Disabilities. Cooperatives have existed since the time of communism as one of the few forms of private enterprises. These legal entities provide employment for three specific groups of people with disabilities (blind, deaf and people with physical disabilities). In 2018, a fourth group was introduced – people with intellectual disabilities. The special status that they receive after entering into a special register under the Law on Persons with Disabilities entitles them to use a special package of support measures and public funding[5].

Today, in the political context of Bulgaria, the topic of social innovation is under the auspices of the Ministry of Labor and Social Policy (MLSP). On the one hand, the continuation of the international policy of the ESF+ is ensured, as the ministry follows the strategic direction of the institution. On the other hand, over the years, the MLSP has actively worked on policies, strategies and initiatives in support of the development of social innovation. Social innovation is enshrined in several strategic program documents, such as the National Recovery and Resilience Plan and the Operational Program "Human Resources Development" 2021-2027[3]. Within the framework of the OPHRD, a resource is foreseen to enable the creation and the first steps of the future expert center for social innovation in Bulgaria. In the country, two consortia have been authorized

by the MLSP to work on its construction – FUSE (Facilitating Unified Approaches for Social Innovation in Europe) and Social Innovation Plus – Centers of Expertise (SI Plus). Sharing the same goal and operating within the ecosystem, the two projects exchange data, documents and information in the process.

In 2012, the Council of Ministers (CoM) of the Republic of Bulgaria adopted a National Concept for Social Economy, which provides a framework for the development of the social economy and social entrepreneurship in the country. It includes principles, objectives and a vision for promoting social enterprises[8]. Later, in 2014, an „Action Plan for Social Economy" was developed by the MLSP and adopted by the CoM. This plan includes priorities such as raising awareness, creating supporting structures and education in the field of social economy[11]. A Detailed Plan for Social Innovation in Bulgaria has also been developed[2].

Since 2021, through the BCause Foundation, Bulgaria has been involved in the activities of an international consortium (Ireland, Portugal, Cyprus and Bulgaria) under the FUSE project. The project is funded by the European Union Programme for Competence Centres for Social Innovation (European Social Fund and the European Union Programme for Employment and Social Innovation) under a grant agreement. The main objective of the project is to establish national hubs in almost all EU countries, through which social innovation can be supported by a network of experts representing all major sectors – private, public, academic and civil, both at national and European level. The key result, in addition to National Expertise Hubs for Social Innovation, is the development of national detailed strategy and action plans to support social innovation and build capacity among stakeholders. This and other similar projects build a broader ecosystem of social innovation and improve the effectiveness of the ESF+ (European Social Fund Plus) as the main EU instrument for investing in people and supporting the implementation of the European Pillar of Social Rights. The mentioned projects identify social innovations with potential for scaling up in order to offer developed tools and methodologies for support.

The ESF funds numerous initiatives aimed at supporting social entrepreneurship in the country, aimed at social inclusion, youth employment and combating poverty. These include training, access to finance and the development of social enterprise networks. Part of the funds are used for training and support of social enterprises that work with vulnerable groups.

During the Annual National Awards for Social Innovations in Support of the Social Economy, the Minister of Labor and Social Policy Ivaylo Ivanov shared: „Employment is the most effective tool for the full inclusion of people with specific needs in society and contributes to improving the quality of their lives." He emphasized that in recent years the MLSP has developed a stable regulatory framework in support of social enterprises. „We have created a certificate of the „Social Enterprise Product" brand and a Register of Social Enterprises. 120 social enterprises that provide jobs and support vulnerable groups are already registered in it." [10] Prominent social enterprises with social innovations related to employment are the social enterprise „Give Me a Dream" at the Association for Support of Persons with Mental Disabilities, the „EKO Center for Sheltered Employment" at the social enterprise „Family Center with Maria" EOOD and the Association „Made with Love 21". Leading enterprises with social innovations related to social inclusion are the Association "European Future for the People of Bulgaria", "Brand Hotels" EOOD, Non-profit Association "SMILE" and the Association "Young Researchers for Youth Development". Association Women's Charity Society "Maichina Grža" – Gabrovo, Center for Early Childhood Development "Patechka" at the National Association of People Working with People with Disabilities, "Inde 9" EOOD and Chavdar Municipality are distinguished enterprises with social innovations related to the provision of social products and services. The startup BrighThrive deserves special attention for its innovative idea for a mobile application that uses artificial intelligence to create personalized curricula adapted to the needs of each child with special educational needs. These enterprises are a good example of the efforts to build a society in which everyone has a place and a chance for development. Their results show that through creativity and determination, new and sustainable opportunities are created for vulnerable groups, a more just and solidary society. Social innovation is a driver of positive change and every good practice is an inspiring example that spreads throughout the country.

As a result of the analysis of the national context, we find that the conditions for the development and implementation of social innovations in social enterprises are extremely favorable. The reasons are: the

financial support from the European Union through initiatives such as the ESF, which provide resources for the development of social enterprises; the National Concept for Social Economy, which creates a framework for the development and promotion of social entrepreneurship; the general and specific advantages for social enterprises provided for in Bulgarian legislation; growing public awareness showing increased interest in social causes and sustainable development. These conditions lead to the opportunity to develop appropriate partnerships and close cooperation with the private sector and non-governmental organizations; to the implementation of technological innovations to expand the scope and impact of social enterprises*).*

## 3. Research

### 3.1. Good practices in Bulgaria for change towards a fulfilling life and social inclusion

Social enterprises are like catalysts for positive change – their impact is multifaceted and often goes beyond the initial goals. They can transform not only the economic landscape but also public attitudes by promoting tolerance and empathy.

There are many examples of successful social enterprises in Bulgaria that have left a lasting mark by contributing to social inclusion and initiatives that support vulnerable groups, such as the Roma community or people with disabilities.

However, our research is limited to the Social Enterprises for Labor Integration in the city of Varna, whose main goal is the social and professional integration of workers in need of support, by providing employment and training opportunities to people from vulnerable or marginalized groups who would otherwise face difficulties in integrating into the labor market. They are at the heart of the economic system and include a strong pedagogical dimension. The reason for this choice is that Varna is the city with the largest number of social enterprises in Bulgaria, with 12 new enterprises registered in the last 7 months alone. The enterprises provide employment to people from vulnerable groups, including refugees, people with disabilities, young people with special educational needs, and others. [4] They offer a variety of services and products, such as landscaping, catering, and production of souvenirs and gifts. Social enterprises in Varna are supported by the Regional Center for Social Economy, established under a project of the Ministry of Labour and Social Policy. [9] The center is part of the national network for the development of the social economy and is funded under the Recovery and Sustainability Plan. The regional center provides free consultations, marketing services, and assistance with registration in the National Register of Social Enterprises. In addition, a municipal fund with a budget of BGN 150,000 has been established in Varna, which finances projects of social enterprises that have managed to create sustainable partnerships with large businesses and institutions. As a result of the activities of these social enterprises, jobs have been provided for over 65 people from vulnerable groups. [4]

Leading successful practices of innovative social enterprises from Varna region are:

- An eco-center, whose main activity is landscaping and maintenance of public spaces, such as the Roman Baths. It provides employment to people with limited access to the labor market, while promoting sustainable development.
- A social enterprise „Akademika“ of the Varna University of Management runs a modern bistro that offers healthy food and provides sheltered employment to young people with various deficits. It is an example of the integration of vulnerable groups through social entrepreneurship.
- Within the framework of initiatives and projects for sustainable tourism, social enterprises produce ecological souvenirs. These projects combine social commitment and environmental responsibility.

We will pay special attention to the Association "Business Agency", which has made an exceptional contribution to social entrepreneurship and innovation with its project activities and the results achieved for more than 18 years. Moreover, it is an example of successful attraction and management of financial resources provided by the EU and the state budget, and of large-scale partnership regardless of language barriers and the peculiarities of national cultures, in favor of social causes to solve pressing problems of people in risk groups.

The projects implemented by the Association "Business Agency" are financed from various sources such as the Operational Program "Human Resources Development" 2007-2013, co-financed by the European Union through the European Social Fund; the Interreg Europe 2014-2020 program financed by the European Regional

Development Fund; Erasmus+, Competitiveness and Innovation in Enterprises Programme – Bulgaria 2021-2027, as a tool for implementing the EU Cohesion Policy for the period 2021-2027, etc.

Association "Business Agency" effectively works with local and foreign partners, such as the Vocational Training Center (VTC) at Excelia EOOD, Varna, Association "Agency for Social Development – VISION", VTC "Materika" at the Materika Foundation; Nicosia Development Agency (ANEL) from Cyprus; business women's associations from Greece, Bulgaria, Georgia, Turkey and a tourism association from Armenia; the European networks EASPD and ENSIE, 16 representatives of the WISE sector, 13 VET providers, a European research institute, with partners from 13 European countries: Austria, Belgium, France, the Netherlands, Bulgaria, Latvia, Poland, Romania, Croatia, Greece, Italy, Slovenia and Spain.

The results of the projects of the Business Agency Association are:

1. Regarding social entrepreneurship in general

• Popularization of successful practices of social entrepreneurship.

• Developed procedures, methodologies and manuals related to the activities of a supported social enterprise in line with the regional specificities of Varna region.

• Multiplied the experience and practice of the existing social enterprise, through training and consultations, to increase the management and business skills of specialists wishing to be involved in the social economy sector.

• Activation of civil society in initiatives to increase public support for social entrepreneurship and to remove the stigma of "diversity" and "inferiority" by organizing regional campaigns.

2. Regarding people from risk groups

• Innovative approaches for supported employment, sheltered employment and social inclusion of people from risk groups in leading enterprises from the structurally determining industries for Varna region have been introduced.

• Expanding the activities of the existing Center for Social Rehabilitation and Integration of Adults, by providing consulting and training services in a total of 15 professions, tailored to the limitations and specificities of people from risk groups, thus supporting them for a smooth transition to the real labor market.

• A multiplied innovative model of a social enterprise for creating the labor market-demanded labor skills of people from risk groups, as an opportunity for their long-term social inclusion.

3. Regarding people with disabilities

• An integrated model of an innovative social service – "one-stop shop", which increases the degree of use of information and communication technologies and technological and assistive innovations in the development, delivery and use of social services by people with disabilities (physical, hearing or visual) as a condition for their more effective inclusion in public life.

• Generating innovations to solve previously unmet needs identified by interested groups in the so-called a four-helix model involving formal care institutions (i.e. hospitals, social homes, social service providers), government institutions, representatives of the academic community, business and the non-governmental sector.

• Innovative solutions for home care by strengthening cooperation in regional innovation chains.

• Online job exchange for people with disabilities on the Internet. People with disabilities are looking for work with a video CV.

4. Regarding older people

• Building digital entrepreneurship skills in older people through an innovative training system.

• Developing sustainable ecosystems that will transform working Baby Boomers (56-76) and Generation X (41-55) into self-employed digital entrepreneurs. Building trust among industry and business towards digitally self-employed people of these ages.

• Innovative eDigiStars system with 3 modules – POWERYOU to empower older people for digital self-employment, CAMPUS to adapt relevant digital skills courses to the specific needs of older people and LABEL to ensure quality and build trust among SMEs towards a new „workforce“.

5. On gender equality and promoting female entrepreneurship

• Promoting gender equality in cooperation with civil society organisations and public authorities, as well

as knowledge exchange through the organisation of seminars.

• Cross-border cooperation to provide women with best practices and successful policies already implemented in the region to bring them closer to entrepreneurship and increase their employment.

• WE TOUR Portal – a global knowledge sharing network, for exchanging information on national policies on women entrepreneurs, as well as valuable contacts for cross-border visits and cooperation, best practices, business management support.

• Building capacity in women's entrepreneurship in the tourism sector by developing and organizing trainings and programs on entrepreneurship, business management and digital marketing.

• Improving the role of women and supporting women entrepreneurs in the Black Sea Basin region by developing an awareness-raising campaign. Increasing women's confidence and their business skills by creating a strong network and long-term partnership between women's support organizations, business organizations, public authorities and other local stakeholders.

6. Regarding workers in need of support, which may include long-term unemployed people, people with disabilities, older people, migrants, NEETS and other groups at higher risk of being excluded from the labour market.[6]

• Participate in the development of a European Blueprint to address digital skills needs in the Work Integration Social Enterprise (WISE) sector.

• Promote the attractiveness of the WISE sector as a career choice and raise awareness of the importance of digital technologies in supporting workers at higher risk of being excluded from the labour market.

• Develop a reliable and sustainable plan to match the demand (employees/employers) and supply (VET providers) of the identified skills needs.

• Update transnational vocational training curricula in line with new labour market needs.

• Creation, testing and validation at national level of three training curricula to address the skills gaps of integration workers, their supporters and their managers.

• Support the exchange of good practices at national and regional level, favouring the development of a sustainable community supporting the growth of skills, innovation and competitiveness in the sector.

Examples from practices in Bulgaria prove the wealth of opportunities for ideas, sharing of experience and joint work for sustainable achievements in the field of social economy, which is provided by a well-maintained network of experts in various fields. Persistence and purposeful actions, combined with the skillful management of human capital and financial resources, leads to undeniable successes.

### 3.2. Challenges and opportunities for innovative social enterprises

Social enterprises in Bulgaria face a number of legislative, economic, educational and financial challenges that hinder their development and sustainability.

Bulgaria already has a Law on Social and Solidarity Economy Enterprises, which provides a legal framework for social enterprises. This law is an important step forward in the regulation of social entrepreneurship and creates conditions for their activities. However, in some aspects, social enterprises may face challenges related to the implementation of the law in practice. For example: lack of awareness among some social entrepreneurs about the regulations; uneven distribution of supporting mechanisms, such as regional centers for social economy; administrative difficulties in certification or access to financing under the terms of the law, etc. So, the problem is not the lack of a legal framework, but rather the need for its optimal implementation and support for social enterprises. The concept of social entrepreneurship is still not popular enough in Bulgaria, which leads to a lack of support from society and business. The changing economic environment in the country makes it difficult for social enterprises to plan and sustain long-term. Most social enterprises rely on grants and subsidies, but access to such funds is limited and often requires complex administrative procedures. The lack of specialized training and development programs for social entrepreneurs limits their capacity for management and innovation. This leads to an unclear labor market with limited human resources with the necessary qualifications and competences or self-employed individuals.

Favorable opportunities to overcome these challenges are:

• Programmes such as Interreg Europe allow public authorities, public law bodies and non-profit

organisations operating for private benefit, involved in regional development, to exchange practices and ideas on the implementation of public policies, thus finding solutions to improve their strategies for the benefit of citizens in line with the priorities of smart, sustainable and inclusive growth. Interreg Europe helps regional and local authorities across Europe to develop and deliver better policies. Projects such as HoCare address the issues of population ageing and aim to improve the implementation of regional development policies and programmes that support the delivery of innovation by actors in regional innovation chains.

- The exchange of experience between stakeholders leads to an increase in the effectiveness and impact of the Structural Funds on local policies. It shortens the path and time from the creation of the innovative solution to its implementation.
- The good practices formulated, subject to transfer, allow the definition of new policies, for example in the field of home care and their transfer. The accumulated knowledge leads to mutual learning processes in the EU and to improving policies through the organisation of international events and training events at national level.
- At national level, all EU countries develop national digital skills strategies. In their respective parts, usually chapters on "Digital Economy and Society", the strategies require citizens' readiness for changes in the labour market, education and digital skills building. Cooperation between stakeholders in the fields of education, employment and industry to improve the digital technology skills of the wider population, not only IT professionals, is focused on building digital skills of unemployed older people and people with disabilities.
- Digitalisation of social enterprises and applicability of artificial intelligence (AI). Creation of a national platform for social initiatives, to attract funds from both society and corporate sponsors. Integration with blockchain technologies for transparency of funding and impact tracking. The use of AI has brought about remarkable changes in various economic sectors such as healthcare, industry, commerce and transport, offering significant increases in productivity and efficiency. Its main business applications include automation, image/face recognition, natural language processing, data analysis and decision-making, the latter including improved information management and predictive capabilities. While awareness of AI is almost universal, the implementation of AI varies significantly across different areas of social entrepreneurship, which poses a challenge for the economic development and competitiveness of social enterprises. Early adopters of artificial intelligence are usually either large corporations or small, niche start-ups with access to the technological know-how required for earlier forms of AI implementation. Social enterprises face a number of barriers to AI implementation, such as lack of awareness and readiness to work with data, lack of human capital and skills, lack of funding, lack of networking and collaboration, as well as reputational, business and legal risks. The overall objective of projects such as embrAIsme is to improve policies and programmes to promote the deployment of AI in social enterprises, regardless of their location, size and sector; to increase data readiness, to invest in human potential and skills, to facilitate access to finance, to encourage networking and collaboration, to ensure better consideration of legal and ethical issues.
- The ageing population as a trend presents us with numerous social changes and challenges for which adequate solutions must be found. But, at the same time, this trend means an opportunity for growth and jobs, as there is a great potential for businesses to offer innovative solutions for home care. Also, older people could not only be trained in digital skills, but also employed or self-employed in appropriate areas.

## 4. Conclusion

The social economy is something serious and proven all over the world, especially in the USA, Australia, the EU and in poorer countries. Supporting this economy is the most promising way to free the real economy from the need to allocate funds for social benefits. This is how public and private funds are invested in the creation of social enterprises.

In Bulgaria, there are serious attempts to create a perspective for social entrepreneurship, which is a form of creating enterprises with guaranteed employment for people from various marginal groups and with various types of disabilities.

Awareness of social enterprises is a way to accept the challenges of implementing social innovations.

Cooperation between various stakeholders not only from Bulgaria, but also from the countries of the EU and the whole world, is a way to overcome the challenges facing social enterprises. Digitalization and the use of artificial intelligence are means to achieve the social goals of innovative social enterprises and society as a whole.

To harness, expand and develop the potential of innovative social enterprises, the social innovation ecosystem in Bulgaria must draw on its collective and collaborative expertise, experience and know-how. This implies that the new training programs and forms of learning provided should go beyond the framework of specialized training centers and become the subject of teaching in other educational institutions, including universities.

**References**

1. Avelino, F., & Wittmayer, J. (2017). Transformative social innovation and disempowerment. https://www.researchgate.net/publication/317392170_Transformative_social_innovation_and_disempowerment

2. BCause Foundation. (2023). Blueprint for Social Innovation in Bulgaria. https://www.easi.bcause.bg/images/2023/BlueprintforSocialInnovationinBulgaria_BG.pdf

3. BCause Foundation. (n.d.). EASI for Social Enterprises. Retrieved from https://www.easi.bcause.bg/

4. Black Sea. (n.d.). Varna is the city with the largest number of social enterprises in Bulgaria. https://www.chernomore.bg/a/2 – Varna/263239 – Varna-e-gradat-s-nay-golyam-broy-sotsialni-predpriyatiya-v-balgariya

5. Bulgarian Center for Not-for-Profit Law. (n.d.). Desk Research: Social Enterprise Needs Analysis in Bulgaria. https://bcnl.org/uploadfiles/documents/Desk%20Research_SE_needs-analysis_Bulgaria.pdf

6. B-WISE Project. (n.d.). Официален уебсайт на проекта B-WISE. https://www.bwiseproject.eu/bg/

7. European Union. (2021). Regulation (EU) 2021/1057 of the European Parliament and of the Council. https://eur-lex.europa.eu/legal-content/BG/TXT/HTML/?uri=CELEX:32021R1057

8. Ministry of Labour and Social Policy of Bulgaria. (2022). National Concept for Social Economy. https://seconomy.mlsp.government.bg/wp-content/uploads/2022/12/NACIONALNA_CONCEPCIA_ZA_SOCIALNA_IKONOMIKA.pdf

9. Ministry of Labour and Social Policy of Bulgaria. (n.d.). A fund to support social enterprises is being created in Varna at the initiative of the regional center for social economy. https://mlsp.government.bg/fond-za-podkrepa-na-sotsialnite-predpriyatiya-szdavat-vv – Varna-po-initsiativa-na-regionalniya-tsentr-za-sotsialna-ikonomika

10. Ministry of Labour and Social Policy of Bulgaria. (n.d.). The leadership of the MLSP presented the annual national awards for social innovations. https://www.mlsp.government.bg/rkovodstvoto-na-mtsp-vrchi-godishnite-natsionalni-nagradi-za-sotsialni-inovatsii

11. NASO (National Alliance for Social Responsibility). (n.d.). Social Economy in Bulgaria: Analytical Overview. https://archiv.naso.bg/images/files/3_SocialEconomy.pdf

12. University of Plovdiv. (2020). A guide for social entrepreneurs. https://storefisn.uni-plovdiv.bg/sf/wp-content/uploads/2020/06/RDU-Narachnik_BG.pdf

ISSN (Online): 2815-5084

INTERNATIONAL SCIENTIFIC AND PRACTICAL CONFERENCE ON HUMAN RESOURCE MANAGEMENT
DOI: 10.56065/HRM/2026.133, pp. 133 – 141

7th edition, 3 October 2025
University of Economics-Varna

# THE ROLE OF INNOVATIVE CULTURE FOR THE DEVELOPMENT OF THE MARITIME INDUSTRY IN THE REPUBLIC OF BULGARIA

**Kamelia NARLEVA[1], Silvena YORDANOVA[2]**

[1] Associate professor, *Nikola Vaptsarov Naval Academy*, Varna, Bulgaria, k.narleva@nvna.eu
[2] Associate professor, *College of tourism-Blagoevgrad*, silvena_dencheva@abv.bg

**JEL: O14**

**Key words:**
Innovations, innovative culture, cruise industry, cruise enterpreneurship

**Abstract**

The rapid advancement of scientific and technological progress, the integration of new digital solutions, and the intensification of organizational change have transformed the modern business environment. Increasing competition, the diversification of products and services, and the accelerated obsolescence of goods necessitate the adoption of innovation management as a strategic response. Furthermore, the limitations of traditional management practices – characterized by inefficiency, rigid compensation systems, and inadequate adaptability – underscore the growing importance of innovative approaches to organizational development.

This paper examines the role, challenges, and developmental trends of innovation management with a particular focus on the maritime industry of the Republic of Bulgaria. The study addresses theoretical, methodological, and applied dimensions of innovation management and investigates a selected sample of 20 companies operating in the blue economy within the Varna district. The empirical findings highlight the growing significance of innovation management for enhancing competitiveness, sustainability, and entrepreneurial capacity in maritime enterprises. The paper concludes by offering practical recommendations for fostering a socially responsible and innovation-oriented future for Bulgaria's maritime industry.

**Published by University of Economics – Varna**

***Citation:*** Narleva, K., Yordanova, S.. The Role Of Innovative Culture For The Development Of The Maritime Industry In The Republic Of Bulgaria. *Proceedings from 7th International Scientific and Practical Conference on Human Resource Management (ICHRM).* University of Economics – Varna, pp. 133 – 141. DOI: 10.56065/HRM/2026.133

## 1. Introduction

Since the 1980s, innovation management has gained increasing prominence both as a field of academic inquiry and as a practical approach to business development. The interest in innovation management can be examined from two perspectives: broad and narrow. From a broad perspective, the recognition of human creativity and educational potential as drivers of economic and societal progress has positioned innovation as a central determinant of competitiveness. In this context, the emergence of modern management approaches—such as innovation management—can be understood as a response to profound social, demographic, cultural, and global transformations (Afuah, 2023; Chesbrough, 2023).

From a narrower perspective, the relevance of innovation management arises from the specific demands of the contemporary business environment: rapid technological progress, accelerated scientific and technical advancement, increasing organizational complexity, diversification of products and services, shortened product life cycles, and intensified global competition (Christensen, 2016). At the same time, critical global challenges—such as climate change, migration, and international conflicts—necessitate constant innovation across sectors. The limitations of traditional management practices, including inefficiency, rigid planning structures, and inadequate adaptability to dynamic conditions, further underscore the necessity of adopting innovation management as a strategic framework (Chang, 2020; Clia, 2023; Day, 2019).

The academic research highlights several common traits of innovative cultures:

**Psychological Safety:** Employees feel safe to voice unconventional ideas (Edmondson, 1999).

**Collaboration and Diversity:** Innovation thrives when diverse perspectives intersect (Page, 2007).

**Learning Orientation:** Failure is reframed as a source of insight (Garvin, 1993).

**Agility and Flexibility:** Decision-making structures support rapid adaptation (Doz & Kosonen, 2008).

**Empowered Employees:** Autonomy encourages ownership and creativity (Deci & Ryan, 2000).

Maritime organizations operating in today's rapidly changing, technology-driven global economy are particularly vulnerable to these dynamics. They face a unique set of challenges ranging from piracy and geopolitical instability to environmental sustainability requirements and disruptive technological innovations (Lee, 2020). Moreover, the imperative to reduce carbon emissions, prevent marine pollution, and comply with international environmental standards compels maritime enterprises to adopt innovative strategies and solutions. The marine industry is among the oldest and most globalized sectors, traditionally characterized by conservatism and risk aversion (Stopford, 2009). However, contemporary challenges—ranging from the International Maritime Organization's (IMO) decarbonization targets to automation and smart shipping—demand innovation at an unprecedented pace (DNV, 2021). An innovative culture has therefore become vital for adapting to regulatory, technological, and societal changes.

The digitalization of the blue economy has further intensified competitive pressures, requiring the rapid development of products and services with enhanced functionality, standardized quality, and reduced costs. This paradox of rising expectations has generated a pressing need for internal entrepreneurial practices and organizational innovation. Yet, many established maritime companies struggle to integrate entrepreneurial approaches into their rigid, hierarchical structures. While some sectors of the maritime industry—such as cruise shipping—have successfully institutionalized entrepreneurial capacity, others remain resistant to such initiatives (Christensen, 2016; Alexiev & Narlev, 2025).

In response to these challenges, this paper seeks to investigate the role, challenges, and future directions of innovation management within Bulgaria's maritime industry. The study focuses on both theoretical and methodological aspects, while also providing empirical insights from a sample of companies operating in the blue economy.

## 2. Literature Review

Sustainable competitiveness in contemporary markets requires organizations to pursue continuous innovation, growth, and value creation. Innovation management provides the framework through which companies can nurture an entrepreneurial mindset, thereby fostering a culture of creativity and long-term development. To achieve this, organizations must articulate clear strategic goals across three dimensions:

**1. Human capital** – cultivating employees with entrepreneurial skills and leveraging their creative potential effectively;

**2. Organizational design** – establishing structures that support intrapreneurship and reduce bureaucratic resistance;

**3. Decision-making processes** – developing mechanisms for rigorous evaluation and evidence-based strategic choices (O'Connor, Corbett, & Peters, 2022).

The effectiveness of innovation management depends on the organization's ability to align these strategic goals with both internal dynamics and external pressures. The literature identifies several key determinants of this process:

- **Radical product innovation**: a focus on introducing novel products, processes, and organizational systems;
- **Risk orientation**: the willingness to allocate resources toward initiatives with uncertain outcomes;
- **Proactiveness**: the pursuit of opportunities, competitive aggressiveness, and confidence in driving innovation-led growth (Keeley et al., 2023).

A company's innovative capacity is shaped not only by its technological resources but also by its culture.

Innovation-oriented cultures combine **capability** (skills and expertise), **willingness** (organizational commitment), and **potential** (resources and structural support) (Lead-Innovation, 2023).

Innovative culture refers to the set of organizational values, norms, and practices that promote creativity, risk-taking, and continuous learning (Schein, 2010). It is a culture where employees feel empowered to generate new ideas, challenge existing processes, and collaborate across boundaries to develop novel solutions (Amabile & Khaire, 2008).

The development of an innovative culture is shaped by several factors:

- **Leadership Role Modeling:** Leaders who embody curiosity and openness foster innovation (Bass & Riggio, 2006).
- **Organizational Structures:** Agile teams, cross-functional collaboration, and dedicated innovation labs accelerate idea development (Brown, 2009).
- **Incentives and Recognition:** Recognition of effort, not just outcomes, sustains motivation (Amabile, 1996).
- **Technology and Tools:** Digital platforms enable collaboration and rapid prototyping (Chesbrough, 2003).
- **External Ecosystem:** Partnerships with startups, Naval Academy university, and other organizations enhance innovation capacity (Powell et al., 1996).

The maritime sector, which underpins the global transportation of goods and materials, has developed numerous innovations to address sustainability and efficiency challenges. Examples include autonomous vessels, resource conservation technologies, and new approaches to raw material utilization (Chesbrough, 2010).

However, the successful implementation of such innovations requires sophisticated management practices. In the marine industry, innovative culture refers to organizational values and practices that encourage experimentation, adoption of new technologies, and collaborative problem-solving. Unlike industries with shorter product cycles, marine innovation often requires large-scale investment and long-term orientation (Poulsen et al., 2018). Thus, cultivating innovation means balancing tradition and safety with openness to disruptive change.

Firms within the industry vary considerably in their orientation toward innovation. This variability can be represented along a continuum between **conservatism**—where firms are risk-averse, slow to adopt change, and strategically cautious—and **entrepreneurial intensity**, characterized by proactive, risk-tolerant, and innovation-driven organizations (Trott, 2022; Van de Ven et al., 2021). The relative position of a company on this spectrum depends on both external environmental turbulence and internal organizational frameworks (Utterback, 2021; Teece, 2021).

Companies operating in dynamic and uncertain environments are generally more inclined toward innovation, risk-taking, and proactivity than those in stable markets. The literature emphasizes that firms which can consistently generate streams of innovations are more likely to secure long-term success. Critical enablers include:

- **Reward systems**: effective incentive structures combining goal-setting, feedback, accountability, and performance-based rewards;
- **Management support**: leadership commitment to entrepreneurial activities, provision of resources, and encouragement of innovative ideas;
- **Resource allocation**: availability of financial, human, and technological resources to support experimentation;
- **Organizational structures**: administrative mechanisms to evaluate, select, and implement innovative initiatives (Pisano, 2022).

Taken together, these factors shape the innovation ecosystem within organizations. Figure 1 summarizes the core components of innovation management, including mission and vision, organizational structure, cultural climate, motivation, trust, and the entrepreneurial potential of teams (Utterback, 2021).

Despite its strategic relevance, the application of innovation management in the Bulgarian maritime sector remains insufficiently explored. Existing research overlooks the specific innovation potential of blue economy enterprises, thereby neglecting important opportunities to enhance competitiveness and sustainability. The present study addresses this gap by providing new empirical evidence on the drivers and contributions of innovation management in maritime organizations.

Drivers of Innovative Culture in the Marine Industry

- **Decarbonization Pressures:** IMO[1] targets to reduce greenhouse gas emissions by 50% by 2050 drive investment in alternative fuels (e.g., LNG, ammonia, hydrogen) and energy-efficient technologies (IMO, 2018).
- **Digital Transformation:** A[2]I, IoT[3], and big data enable smart shipping, predictive maintenance, and optimized routing (DNV, 2021).
- **Safety and Risk Management:** Innovation in safety culture, such as remote monitoring and autonomous systems, reduces accidents (Bhattacharya, 2012).
- **Global Competition:** Asian shipyards (e.g., Korea, Japan, China) have adopted innovation-driven strategies to dominate shipbuilding markets (OECD, 2019).
- **Collaborative Ecosystems:** Public–private partnerships, innovation clusters (e.g., Norwegian Maritime Cluster), and university collaborations foster cross-sector knowledge sharing (Hervik et al., 2012).
- I**ndustry Collaboration & Clustering**: Marine Cluster Bulgaria (MCB)—a national NGO[4] of SMEs, R&D organizations, and universities—actively promotes innovation in blue technologies, organizes **Blue Career Days**, and shapes policy frameworks (sciencediver.eueen.bg).
- **New Industry Association**: The establishment of BABI aims to ignite a yacht-building hub in Bulgaria, fostering craftsmanship, overseas brand exposure, and innovation through networking among yacht builders and importers (Marine BusinessMarine Industry News).
- **Regional Innovation Forums**: Events like the **Burgas Blue Summit and Innovation Expo** unite academia representatives, startups, and maritime stakeholders to promote the sustainable blue growth and matchmaking across Black Sea regions (Black Sea Maritime Agenda).
- **Green Tech Projects**: Bulgarian companies, such as Galera Ltd., developed an eco-friendly electric tourist boat, while Solumar engineered filters reducing $CO_2$ emissions by up to 98%, offering cost-effective solutions to shipping emissions.
- **EU-Backed Innovation Initiatives**: Projects like "Innovations for greener maritime industry" developed AI-enabled emission capture systems targeting black carbon and greenhouse gases EEA Grants.
- **Education & Skills Development**: The „**Scientific Research and Innovation for a Sustainable Blue Economy“** forum in Varna spotlighted talent development and recommended a virtual center for Blue Careers to cultivate future expertise.

The drivers for the development of the marine industry in Bulgaria are:

- **EU & Government Initiatives**: Platforms like the Blue Careers Day in Varna foster blue economy skills and innovation dialogues among policymakers, academia, and enterprises Maritime Forum. EU-driven modernization efforts emphasize port digitalization, green shipping, and cybersecurity (Ministry of transport and communications, 2025);
- **Clusters & Innovation Platforms**: Marine Cluster Bulgaria engages in mapping innovation projects across shipbuilding, transport, and offshore energy and identifies shared needs for smarter infrastructure and process optimization(maritime.bg) RAPIV and Varna’s innovation port accelerate deep-tech ideation among startups and established maritime players (TheRecursive.com).

[1] IMO stands for the International Marine Organisation
[2] AI-Artificial intelligence
[3] IoT-Internet of things
[4] NGO-non-profit organization

- **Sustainable Technology Development**: **Bulgarian shipbuilders** specializing in eco-friendly solar/electric vessels are actively seeking international R&D partnerships Enterprise Europe Network.
- **Advanced Engineering Capabilities**:
  - **Naval Technology Bulgaria**, an engineering outpost of Lürssen, is developing multipurpose modular patrol vessels, exemplifying technology transfer and high-end design expertise Naval Technology Bulgaria.
  - The **Bulgarian Ship Hydrodynamics Centre (BSHC)** engages in international R&D collaborations, anchoring marine innovation in scientific networks Bulgarian Ship Hydrodynamics Centre.
- **Institutional Foundations**: Varna-based higher education institutions—like Technical University of Varna and Nikola Vaptsarov Naval Academy—continue to underpin innovation through engineering and marine programs.

To sum up, all elements of the process of innovation management are presented on figure 1.

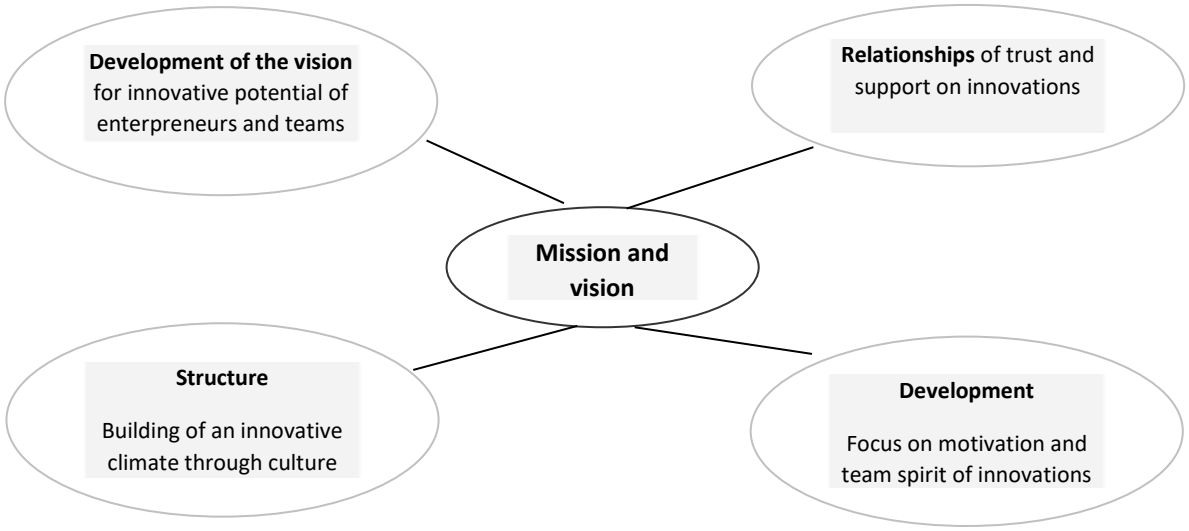



**Fig. 1. Elements of the projects for innovative management**

*Source: Utterback, J. M. (2021). Designing the Successful Corporate Innovation System. MIT Press., p. 33*

It can definitely be argued that science is indebted to the study of innovation management through the prism of the maritime industry of the Republic of Bulgaria. In this regard, the innovation potential of blue enterprises in the country remains insufficiently studied, as well as the consequences of this. A number of opportunities that the application of modern management technologies can reveal to these maritime companies, especially with the increasing changes in the modern business environment, are being ignored. The results of this study are a step towards overcoming these limitations.

## 3. Methodology

This study employed an empirical approach to examine the role and impact of innovation management within Bulgaria's maritime industry. The research targeted a purposively selected sample of 20 shipping companies located in the Varna district, representing the core of the national blue economy.

Research Design. The investigation adopted a pilot study design utilizing a structured survey methodology. Data collection was conducted over a four-year period, from May 2020 to May 2024. The survey instrument was designed to capture multiple dimensions of innovation management, including:

- **Challenges, opportunities, and threats** facing maritime enterprises;

- **The role of innovations** in advancing the blue economy;
- **Contemporary trends** in the management of innovation in maritime organizations.

Data Analysis. To ensure the robustness of findings, the responses were subjected to statistical analysis using the software package **XLSTAT 2024**. Factor analysis was employed to identify the variables most responsible for shaping innovation management processes within maritime enterprises. This approach allowed for the classification of determinants into distinct categories according to their significance, as assessed by managerial respondents.

## 4. Results

The empirical analysis sought to identify the key factors shaping the formation and implementation of innovation management practices in maritime organizations. Based on managerial assessments, the determinants were grouped into three distinct categories according to their relative importance.

### 4.1 Determinants of Innovation Management

**Group One** included factors such as domestic markets and customers, overall organizational management, and the presence of highly qualified employees. These were consistently rated as the most influential in driving innovation activities.

**Group Two** comprised determinants associated with technological and operational processes, including innovations in product and assortment structures, the technological level of production (digitalization, artificial intelligence, automation), and modifications to quality control systems and occupational safety standards.

**Group Three** contained financial and regulatory variables, notably the company's financial position and compliance with international maritime regulations. While important, these were rated as less influential compared to human capital and managerial capacity (Table 1).

Overall, the findings underscore the primacy of human resources and managerial quality as fundamental enablers of innovation management, even when financial and regulatory pressures remain significant.

**Table 1**

**Main reasons for innovation management in the marine companies**

| **Main reasons (factors) for innovation management in the marine companies** | | | | | |
|---|---|---|---|---|---|
| **Factors** | **Yes** | **To some extent yes** | **To some extent No** | **No** | **Missing cases** |
| Innovations | **8 (40%)** | **8 (40%)** | **1 (5%)** | **1 (5%)** | **2 (10%)** |
| The management of the organization | **7 (35%)** | **10 (50%)** | **1 (5%)** | **.** | **2 (10%)** |
| Highly qualified staff | **6 (30%)** | **11 (55%)** | **2 (10%)** | **.** | **1 (5%)** |
| Technological level of development – digitalization of processes, AI, automation | **9 (45%)** | **7 (35%)** | **3 (15%)** | **.** | **1 (5%)** |
| Changes in the systems for quality control and safety | **10 (50%)** | **5 (25%)** | **4 (20%)** | **.** | **1 (5%)** |
| Financial status of the company | **2 (10%)** | **11 (55%)** | **3 (15%)** | **1 (5%)** | **3 (15%)** |
| Markets and customers | **8 (40%)** | **9 (45%)** | **.** | **2 (10%)** | **1 (5%)** |
| Marine standards and regulations | **2 (10%)** | **3 (15%)** | **6 (30%)** | **7 (35%)** | **2(10%)** |

*Source: Authors' data 2020 – 2024 year*

### 4.2 Contributions of Innovation Management

The second stage of the analysis examined the specific contributions of innovation management to maritime companies. Survey responses revealed several notable patterns:

- **Operational Improvements**: Managers highlighted significant progress in marketing, market positioning, and customer relations. Similarly, improvements were reported in organizational management practices and production structures.
- **Technological Advancements**: A majority of respondents emphasized the role of innovation management in elevating technological levels and enhancing quality control and safety systems.
- **Human Capital Development**: While improvements in employee qualifications and competencies were acknowledged, they were perceived as secondary outcomes compared to operational and technological contributions.
- **Limited Long-Term Impact**: Respondents noted a relative lack of orientation toward generating subsequent innovations or creating new employment opportunities. Instead, managerial attention appeared concentrated on addressing immediate organizational challenges and achieving short-term competitive gains (Table 2).

### 4.3 Interpretation of Findings

The factor analysis indicates that markets, customers, and skilled human resources are critical to shaping innovative capacity in the maritime industry. This suggests that despite some reluctance to delegate authority, managers recognize the central role of human capital in driving growth, innovation, and organizational development.

Equally important are technological transformations and compliance with international regulations, which function as enabling conditions for sustaining competitiveness. However, the relative neglect of long-term innovation strategies—such as fostering successive innovations and job creation—signals a reactive rather than proactive orientation among maritime managers.

Taken together, the findings reveal that innovation management in Bulgarian maritime enterprises is predominantly focused on immediate operational improvements and technological upgrades, while the potential for sustained, long-term innovation capacity remains underutilized.

**Table 2**

**Contributions of innovation management in the marine companies**

| **Contributions of innovation management in the marine companies** | | | | | |
|---|---|---|---|---|---|
| **Factors** | **Yes** | **Yes to some extent** | **No to some extent** | **No** | **Missing cases** |
| New working stations | **5 (25%)** | **3 (15%)** | **3 (15%)** | **2 (10%)** | **7 (35%)** |
| Improvement in the marketing through new customers, new markets, etc. | **9 (45%)** | **5 (25%)** | **1 (5%)** | **.** | **5 (25%)** |
| IT service improvements | **5 (25%)** | **4 (20%)** | **1 (5%)** | **2 (10%)** | **8 (40%)** |
| Better management | **6 (30%)** | **8 (40%)** | **1 (5%)** | **.** | **5 (25%)** |
| Further innovations | **4 (20%)** | **6 (30%)** | **3 (15%)** | **1(5%)** | **6 (30%)** |
| Improvement in the competencies and skills of the staff | **5 (25%)** | **6 (30%)** | **1 (5%)** | **2 (10%)** | **4 (20%)** |
| Improvement in the product structure | **11 (55%)** | **3 (15%)** | **.** | **1 (5%)** | **5 (25%)** |
| Increase of the technological level | **11 (55%)** | **3 (15%)** | **.** | **2 (10%)** | **4 (20%)** |
| Safe working conditions and quality control | **7 (35%)** | **3 (15%)** | **3 (15%)** | **1 (5%)** | **6 (30%)** |

*Source: Authors' data 2020 – 2024 year*

## 5. Conclusion

The findings of this study demonstrate that the adoption of innovation management within established maritime companies in Bulgaria represents a strategic response to the multifaceted challenges of the contemporary economic environment. Among the most pressing of these challenges are the need for continuous innovation, the effective utilization of human resources, and the management of financial and regulatory constraints.

The empirical evidence suggests that innovation management contributes most directly to product and process innovations, organizational improvements, and technological advancement. These outcomes, in turn, support market expansion and enhance competitiveness. The analysis further indicates that innovation management generates three primary contributions to maritime enterprises:

1. The development and integration of innovative practices;
2. Organizational growth and adaptation;
3. The advancement of technological capacity.

A key implication of these results is the centrality of human resources in driving innovation. Managers must view innovation management not as a short-term corrective tool but as a long-term strategic orientation. By fostering entrepreneurial competencies, providing consistent managerial support, and implementing effective incentive systems, maritime organizations can strengthen their innovative capacity and resilience.

The study also highlights a critical gap in managerial practices: the insufficient emphasis on long-term outcomes such as sustained innovation cycles and employment creation. Addressing this limitation requires a cultural and structural shift toward shared understanding of innovation processes, supported by systematic efforts such as targeted training, organizational dialogue, and capacity-building initiatives.

In conclusion, innovation management should be recognized as a cornerstone of sustainable development in the maritime industry. By embedding innovation into strategic planning and human resource development, Bulgarian maritime companies can better adapt to global challenges, comply with international standards, and secure a competitive position in the evolving blue economy.

Future research should expand the empirical scope of this study to include additional regions and sectors of the maritime industry. Comparative analyses with international cases may also provide valuable insights into best practices and strategies for fostering long-term innovation capacity in maritime enterprises.

**Cultivating an Innovative Culture: Recommendations**

**1. Strengthen Clusters & Networks**: Expand the reach of Marine Cluster Bulgaria and BABI, reinforcing regional hubs and digital platforms for SME collaboration.

**2. Enhance Funding and Support**: Develop mechanisms to provide consulting and innovation financing for tech adoption in marine SMEs.

**3. Build Skills and Talent Pipelines**: Scale programs like Blue Career Days to attract and train youth in maritime technologies and sustainability.

**4. Promote R&D Partnerships**: Facilitate collaboration among academia, private firms, and public bodies to pilot and scale marine technologies.

**5. Strategic Policy Engagement**: Ensure stakeholder voices influence national innovation strategies in blue economy solutions.

**6. Culture of Experimentation**: Encourage agile adoption of solutions like electrification, AI, and green infrastructure in ports and coastal sectors.

## References

1. Alexiev, A., Narlev, Y. Talent Management as a Key Driver for Enhancing the Attractiveness of Maritime Transport, Published by Sciendo Online: Jul 24, 2025, Page range: 4879 – 4886, DOI: https://doi.org/10.2478/picbe-2025-0372.

2. Afuah, A. (2023). Innovation Management: Strategies, Implementation, and Profits (5th ed.). Oxford University Press.

3. Bhattacharya, S. (2012). The effectiveness of the ISM Code: A qualitative enquiry. *Marine Policy*, 36(2), 528–535.

4. DNV (2021). *Maritime Forecast to 2050*. Høvik: DNV GL.

5. Hervik, A., Odeck, J., & Strandenes, S. P. (2012). Innovation in Norwegian maritime clusters. *International Journal of Transport Economics*, 39(1), 79–95.

6. IMO (2018). *Initial IMO Strategy on Reduction of GHG Emissions from Ships*. London: International Maritime Organization.

7. OECD (2019). *Shipbuilding and the Global Economy*. Paris: OECD Publishing.

8. Chesbrough, H. (2023). Open Innovation: The New Imperative for Creating and Profiting from Technology. Harvard Business Review Press.

9. Christensen, C. M. (2016). The Innovator's Dilemma: When New Technologies Cause Great Firms to Fail. Harvard Business Review Press. (Classic but essential)

10. Chang, Y., et al. (2020). Smart Port Practices and Impacts. Maritime Policy & Management, 47(3), 295-317.

11. Clia (2023). 2023 Annual Environmental Technologies Report. Cruise Lines International Association.

12. Day, J. (2019). Introduction to Sustainable Tourism and Responsible Travel. CABI Publishing.

13. Dodgson, M., Gann, D. M., & Phillips, N. (2023). The Oxford Handbook of Innovation Management. Oxford University Press.

14. Hargadon, A. (2022). How Breakthroughs Happen: The Surprising Truth About How Companies Innovate. Harvard Business Review Press.

15. Gray, A. M. (2023). Cruise Industry and Regional Development: A Case Study. Economic Impact Studies, 12, 65-85.

16. Govindarajan, V., & Trimble, C. (2022). The Other Side of Innovation: Solving the Execution Challenge. Harvard Business Review Press.

17. Keeley, L., Walters, H., Pikkel, R., & Quinn, B. (2023). Ten Types of Innovation: The Discipline of Building Breakthroughs. Wiley.

18. Lee, P., et al. (2020). Smart Ports: Toward Green and Sustainable Shipping. Sustainability, 12(3), 1014-1025.

19. O'Connor, G. C., Corbett, A. C., & Peters, L. S. (2022). Beyond the Champion: Institutionalizing Innovation through People. Stanford University Press.

20. Pisano, G. P. (2022). Creative Construction: The DNA of Sustained Innovation. PublicAffairs.

21. Poulsen, R. T., & Johnson, H. (2016). The logic of business vs. the logic of energy management practice. *Transportation Research Part D*, 48, 237–247.

22. Poulsen, R. T., Sornn-Friese, H., & Haakonsson, S. J. (2018). The grand challenges of the marine industry: A systems approach. *Marine Policy*, 97, 130–138.

23. Trott, P. (2022). Innovation Management and New Product Development (7th ed.). Pearson.

24. Van de Ven, A. H., Polley, D. E., Garud, R., & Venkataraman, S. (2021). The Innovation Journey. Oxford University Press.

25. Utterback, J. M. (2021). Designing the Successful Corporate Innovation System. MIT Press.

26. Teece, D. J. (2021). Dynamic Capabilities and Strategic Management: Organizing for Innovation and Growth. Oxford University.

27. World Maritime University (2019). *Transport 2040: Automation, Technology, Employment*. Malmö: WMU

ISSN (Online): 2815-5084

INTERNATIONAL SCIENTIFIC AND PRACTICAL CONFERENCE ON HUMAN RESOURCE MANAGEMENT
DOI: 10.56065/HRM/2026.142, pp. 142 – 152

7th edition, 3 October 2025
University of Economics-Varna

# 360 Feedback 2.0: Empirical Study in Organizational Context

**Petar KRALEV[1], Iva PANAYOTOVA[2]**

[1] Co-founder and CEO Mirror 360 (UC Berkeley MBA), Austin, TX, USA, petar@mirror360.org

[2] CEO Binc Partners, Varna, Bulgaria, panayotova.l.iva@gmail.com

**JEL: O14, P24, C41, E13**

**Abstract**

Traditional performance reviews and engagement surveys are widely criticized as slow, biased, and ineffective, creating a growing need for feedback systems that support real-time learning in modern organizations. This study examines Continuous Anonymous Micro-Reflections (CAMR) as a structural alternative and aims to determine whether CAMR improves the usefulness, fairness, and developmental impact of workplace performance insights. The scope is limited to a 14-week field deployment in a mid-sized organization, which constrains causal inference and long-term generalizability. Using a mixed-methods design, the study analyzes 12,179 micro-reflections generated through the Mirror 360 platform, alongside qualitative interviews with leaders, managers, and employees. Results show that employees with initially low peer-perceived impact demonstrated consistent upward improvement; participation and candor were exceptionally high despite anonymity concerns; and managerial acceptance increased markedly once leaders engaged with CAMR-generated trends. The findings indicate that CAMR provides more timely, psychologically safe, and interpretable insight than legacy review systems and functions as a distinct real-time sensing mechanism rather than an incremental improvement. The study's originality lies in introducing and empirically evaluating CAMR as a new feedback paradigm. Practical implications highlight CAMR's value for organizations seeking early detection of team issues, improved developmental trajectories, reduced political bias, and lower administrative burden.

**Published by University of Economics – Varna**

**Key words:**
Continuous Anonymous Micro-Reflections (CAMR)
Performance management
Organizational feedback systems
Psychological safety
Organizational justice
Real-time organizational sensing
Employee development
Human resource technology
Continuous feedback
Organizational learning

*Citation:* Kralev, P., Panayotova, I. (2026). 360 Feedback 2.0: Empirical Study in Organizational Context. *Proceedings from 7th International Scientific and Practical Conference on Human Resource Management (ICHRM).* University of Economics – Varna, pp. 142 – 152 DOI: 10.56065/HRM/2026.142

## 1. Introduction

Feedback is one of the most powerful drivers of individual learning and organizational performance (Kluger & DeNisi, 1996; Hattie & Timperley, 2007). When employees understand how their work is perceived and how it contributes to collective goals, they make better decisions, collaborate more effectively, and adjust course before problems escalate. For this reason, feedback and evaluation systems remain central to organizational management.

Yet the systems most organizations rely on—annual reviews and episodic engagement surveys—are widely regarded as ineffective, biased, and too slow for modern work. Industry reports indicate that only a small minority of leaders believe these systems add value (Gallup), while just 14% of employees strongly agree that their performance reviews inspire them to improve (Gartner).

These processes are often experienced as political, psychologically unsafe, and disconnected from day-to-day reality.

One reason for this failure is structural: traditional systems are infrequent, manager-mediated, and occur long after relevant events have passed. They produce distorted data, delay critical decisions, and reward impression management rather than truthful communication. In fast-changing environments, such latency represents a strategic risk.

This paper examines an emerging alternative: Continuous Anonymous Micro-Reflections (CAMR), a model implemented through Mirror 360. CAMR provides frequent, low-stakes, anonymous signals about interpersonal contribution and workplace experience. Rather than episodic evaluation, CAMR enables continuous organizational sensing.

The central question guiding this study is: *Can a continuous, anonymous micro-reflection mechanism (CAMR) improve the practical usefulness of workplace performance insights compared to legacy manager-mediated and custom survey-based systems?*

We address this by reviewing the theoretical foundations of CAMR and presenting empirical evidence from field deployments of Mirror 360. Rather than positioning CAMR as a minor refinement, we argue it represents a structurally distinct model of organizational learning designed for environments requiring speed, trust, and real-time adaptation.

## 2. Problem Statement and Literature Review

To assess whether Continuous Anonymous Micro-Reflections (CAMR) can offer a viable alternative to legacy evaluation systems, this section reviews the relevant literature across five domains: (1) the centrality and limitations of traditional feedback interventions, (2) organizational justice and fairness perceptions, (3) psychological safety and interpersonal risk, (4) temporal failure and feedback latency, and (5) the economic and organizational cost of dysfunctional feedback. Together, these areas reveal a deep structural mismatch between modern work—fast, interdependent, and psychologically demanding—and the slow, biased, politically fraught systems organizations still rely on to sense and guide human performance.

### 2.1. Centrality, and Fragility, of Feedback in Organizational Learning

Feedback is widely recognized as a core mechanism for learning, self-regulation, and performance adaptation. Kluger and DeNisi's (1996) meta-analysis, a foundational work in the field, demonstrates that feedback interventions influence performance outcomes in complex and often counterintuitive ways: while feedback improves performance in many cases, it also reduces performance in more than one-third of situations. Feedback Intervention Theory (FIT) argues that negative effects occur when feedback shifts attention away from the task and toward the self, identity threat, or interpersonal anxiety.

Similarly, Hattie and Timperley (2007) find that feedback is beneficial when it clarifies goals, reduces uncertainty, and supports meaningful next steps—but harmful when it is ambiguous, evaluative, or experienced as judgment. These findings directly undermine the assumption underlying traditional review systems: that more feedback is always beneficial.

Instead, the literature suggests that for feedback to be effective, it must be:

- **frequent** rather than episodic,
- **task-focused** rather than identity-threatening,
- **low-stakes** rather than tied to compensation,
- **safe** rather than politically or emotionally risky.

Legacy systems don't deliver on these criteria. Annual reviews and engagement surveys are high-stakes by design, evoke defensiveness, and occur long after the relevant behaviors, diminishing their developmental value.

### 2.2. Organizational Justice and Perceptions of Fairness

Acceptance of feedback depends heavily on whether employees perceive the system as fair. Colquitt's (2001) multidimensional model of organizational justice identifies four fairness domains—distributive, procedural, interpersonal, and informational—all of which are implicated in performance evaluation processes.

Legacy feedback systems routinely fail across these dimensions:

| Justice Dimension | Relevance to Feedback |
|---|---|
| Distributive | Perceived fairness of outcomes (ratings, bonuses, promotion pathways) |
| Procedura | Transparency and consistency of evaluation criteria and processes |
| Interpersonal | Respect and dignity in how feedback is delivered |
| Informational | Adequacy and clarity of explanations underlying feedback judgments |

Large-scale industry surveys (i.e. Gallup, Deloitte) reveal systemic breakdown. In those, the majority of employees—and managers—do not trust performance review systems to be fair, consistent, or helpful.

In post-transition economies such as Bulgaria, these issues may be intensified. Heightened skepticism toward formal evaluation processes, hierarchical communication norms, and fear of workplace reprisal can all amplify the perception that performance reviews are political rather than developmental.

These patterns highlight a legitimacy crisis: employees do not merely dislike feedback processes—they fundamentally distrust them.

### 2.3. Psychological Safety and the Barrier to Honest Feedback

Psychological safety, defined by Edmondson (1999) as the shared belief that speaking up entails no interpersonal risk, is a prerequisite for honest feedback exchange. Yet traditional systems often create precisely the opposite conditions: they are identifiable, evaluative, high-stakes, and tied to compensation or promotability.

Under such conditions, employees predictably:

- avoid upward feedback,
- inflate ratings of peers and managers,
- offer only positive or vague comments,
- engage in impression management to avoid retaliation.

Stone and Heen (2014) describe this as the „feedback paradox“: organizations need feedback to learn, but individuals avoid giving honest input when it threatens identity or relationships. Episodic systems exacerbate this—rare, consequential feedback conversations evoke anxiety and encourage withholding.

Research shows that more frequent, low-stakes, task-proximal feedback reduces defensiveness and improves receptivity (Hysong, 2009). These findings support the need for structurally safer, less identity-relevant mechanisms for feedback—one of the central design principles behind CAMR.

### 2.4. Temporal Failure: The Problem of Feedback Latency

A fundamental flaw in legacy systems is temporal. Traditional reviews and engagement surveys operate on cycles of 90 to 365 days, which are misaligned with the speed and dynamics of modern work. As a result, issues such as disengagement, team conflict, managerial ineffectiveness, or interpersonal tension are detected months after they emerge—often when corrective action is too late.

This introduces what Weick (1995) terms a „sensemaking lag“: the gap between when events occur and when organizations interpret and act on them. Delayed sensing leads to:

- widening performance gaps,
- unresolved conflict,
- misaligned collaboration,
- regretted turnover,
- stalled projects or failed initiatives.

In distributed and hybrid work environments, the cost of delayed insight is even higher. Real-time sensing becomes critical for coordination, morale, and decision-making, consistent with research showing that timely, ongoing sensemaking processes are essential in fast-changing environments (Maitlis & Christianson, 2014).

CAMR is designed explicitly to close this latency gap.

### 2.5. The Organizational Cost of Dysfunctional Feedback

The contradiction in the literature is clear: feedback is essential, yet the systems delivering it are dysfunctional. The consequences of flawed feedback systems are not merely theoretical—they are financially and operationally significant.

- Gallup estimates global productivity loss from disengagement at **$8.8 trillion**, much of it tied to ineffective performance management.
- Industry analyses (e.g., SHRM; Cornell University) estimate that managers spend 210 hours per year on performance processes that are perceived to not improve performance or trust.
- Poorly designed evaluation systems contribute to talent misallocation, avoidable turnover, conflict avoidance, and legal risk (e.g., inequitable ratings).

From a systems perspective, many organizations experience a negative return on feedback investment: high cost, low insight, low trust, and low developmental value.

### 2.6. Gap in the Literature and the Emerging Need for Continuous Models

Although scholars have proposed alternatives—manager-driven check-ins, coaching models, strengths-based systems, team-level learning cycles—these designs remain dependent on interpersonal dynamics and subject to the same political distortions.

What remains underexplored is the role of technology-enabled, anonymous, high-frequency, real-time reflections as a novel structural solution. CAMR seeks to fill this gap by addressing the systemic failures of legacy systems through anonymity, frequency, micro-duration engagement, automation, and aggregation.

This aligns with decades of empirical research in:

- Feedback Intervention Theory (Kluger & DeNisi, 1996),
- Psychological safety (Edmondson, 1999),
- Organizational justice (Colquitt, 2001),
- Real-time sensemaking (Weick, 1995).

## 3. Hypothesis Development

The central research question of this study follows directly from the theoretical foundation in section 2:

*Can a continuous, anonymous micro-reflection mechanism (CAMR) improve the practical usefulness of workplace performance insights compared to legacy manager-mediated and survey-based systems?*

To address this question empirically, we derive three hypotheses that reflect the mechanisms through which CAMR is expected to add value:

First, by providing ongoing feedback with low interpersonal risk, CAMR should support development over time, especially for employees who begin with lower peer-perceived impact.

Second, the anonymity and low-stakes and low-friction nature of micro-reflections should foster high levels of participation and candid input.

Third, if CAMR yields insights that are easier for leaders to interpret and act upon, managers should demonstrate greater acceptance and perceived usefulness once they gain familiarity with the system.

Together, these hypotheses offer a clear framework for evaluating whether CAMR can meaningfully improve the usefulness of workplace performance insight relative to traditional feedback systems. While CAMR introduces new constructs, this study focuses on practical utility rather than full psychometric validation.

## 4. Mechanical Design of the CAMR System

Continuous Anonymous Micro-Reflections (CAMR) represent a standardized, technology-mediated mechanism for capturing real-time perceptions of workplace collaboration, contribution, and interpersonal dynamics. Unlike traditional feedback processes that rely on episodic evaluations or manager-mediated assessments, CAMR is built on four structural components: (1) micro-duration reflections, (2) continuous frequency, (3) standardized prompts, and (4) anonymity through aggregation and system design. Together,

these elements create a low-friction, psychologically safe feedback environment capable of generating ongoing insight.

### 4.1. Micro-Duration Reflections

CAMR is designed around reflections that take approximately 20–30 seconds to complete. Each reflection consists of a small number of intuitively phrased prompts that focus on recent impressions. They also include the ability to submit a qualitative micro-note. Brevity and UX design minimize cognitive load and reduce the evaluative pressure associated with traditional feedback formats. The micro-duration model increases participation and helps ensure that reflections capture immediate, experience-near perceptions, rather than retrospective reconstruction.

### 4.2. Continuous Frequency and Time-Weighted Aggregation

Reflections are collected continuously, with employees receiving rotating prompts weekly. This creates a stream of micro-observations that accumulate into trend-based patterns. Each reflection is time-stamped and incorporated into rolling, time-weighted aggregates that highlight directional change rather than isolated events. The continuous design allows organizations to detect shifts in morale, collaboration, and interpersonal perceptions much earlier than annual or periodic surveys.

Continuous frequency also serves a second purpose: it reduces the stakes and emotional salience of any single observation. Because each reflection is only one of many, employees can provide honest input without fear that one comment determines an outcome. This supports higher candor and reduces impression management.

### 4.3. Standardized Prompts and Structured Dimensions

A defining feature of CAMR is its use of standardized prompts and rating dimensions applied uniformly across participants. These dimensions (e.g., perceived impact, reliability, sense of fulfillment, workplace experience) remain consistent over time, allowing comparisons across individuals, teams, and time periods.

Standardization serves several functions:

- Improves reliability by reducing variability in how feedback is understood.
- Increases fairness through consistent criteria rather than manager-specific preferences.
- Enhances interpretability by providing leaders with stable metrics and comparable indicators.
- Supports automation by ensuring that the system can aggregate and analyze data without manual intervention.

By minimizing ambiguity and subjectivity in the prompting structure, CAMR avoids many bias-related pitfalls of traditional evaluation methods.

### 4.4. Anonymity Through Aggregation

Anonymity is ensured not by simply removing names, but by aggregating reflections into composite indicators that only become visible once a minimum threshold of responses is met. This prevents individuals from being identifiable through writing style, time stamps, or relationship patterns. The aggregation threshold is typically set at a team level, ensuring that no reflection can be traced back to an individual contributor.

This structural anonymity is central to the CAMR model. It reduces interpersonal risk, encourages upward and lateral candor, and protects employees from potential retaliation or social consequences. Research on psychological safety suggests that the removal of identity cues can dramatically increase willingness to disclose concerns or critique higher-power individuals—dynamics essential for accurate sensing within organizations.

### 4.5. Automated Delivery and Passive Sensemaking

The CAMR model is delivered through an automated platform that schedules, delivers, and collects

reflections without requiring managerial mediation. Employees receive prompts through email, text, or internal communication channels, and responses are collected and processed automatically. Leaders view aggregated insights through dashboards that highlight trends, outliers, and directional changes across time, while employees gain access to aggregated „self-awareness reports“ in real time. This automation accomplishes three goals:

1. Reduces administrative workload, eliminating the need for HR or managers to request, collect, or compile feedback.

2. Increases consistency, ensuring that every employee receives the same frequency and structure of prompts and feedback.

3. Supports passive organizational sensemaking, enabling leaders to detect emerging issues without staging formal assessments.

Automation also reduces the performative and political aspects of traditional evaluation and survey administration, allowing feedback to function as a more neutral sensing mechanism.




**Fig. 1. Schematic representation of a CAMR System (Mirror 360)**

### 4.6. Distinguishing CAMR from Traditional Feedback Systems

CAMR differs from legacy feedback systems along several structural dimensions.

**Table. 1**

**Formal Feedback Channels vs. CAMR**

| Feature | Traditional Reviews/Surveys | CAMR |
|---|---|---|
| Frequency | Annual or episodic | Continuous (weekly) |
| Risk Level | High (identity-based) | Low (anonymous, micro-duration) |
| Bias Exposure | High (manager-dependent) | Low (standardized, automated) |
| Latency of Insight | Months | Days or weeks |
| Cognitive Load | High | Minimal |
| Usefulness | One-off, backward-looking | Trend-based and near real-time |

These distinctions reflect the theoretical argument that CAMR constitutes not an incremental improvement to existing processes, but a structurally distinct model of performance sensing and organizational learning.

## 5. Empirical Test and Methodology

### 5.1. Research Setting and Sample

The empirical analysis draws on multi-month field deployments of the Mirror 360 CAMR system in a mid-sized organization of 144 employees and growing. All employees, managers, and leadership participated in the test.

During the first 14-weeks of deployment (evaluation period), participants had the opportunity to respond to 12,179 algorithmically-generated micro-reflection invitations, based on system settings and pre-set coworking relationships. These invitations nudged participants to evaluate either (a) perceived contributions by colleagues (Impact Score) and their behaviors (Strengths & Weaknesses Indicators); or (b) sense of personal satisfaction (aggregated in Team Fulfillment Scores) and overall workplace experience (shown as „Contributors & Detractors“ Heatmap). N for the former was 10,146; N for the latter was 2,033.

An independent HR consultant, and the co-author of this study, conducted the onboarding process and training for employees and managers. Over the course of the evaluation period she conducted interviews with the owner, HR leadership, managers, and employees.

### 5.2. Measures

- **Participation Rates:** Proportion of employees submitting weekly 360 and self-reflections.
- **Impact Score:** Time and credibility-weighted composite of the perceived recent contribution by individuals, scaled 0-360.
- **Fulfillment Score:** Self-reported measure of intrinsic motivation and energy.
- **Workplace Experience Indices:** Aggregated team-level sentiment about team dynamics and workplace environment.
- **Manager Adoption Indicator:** Binary and qualitative measure of whether managers endorsed continued deployment of CAMR.

The dataset allowed for longitudinal traces for employees with initially low, moderate, or high impact scores, enabling analysis of developmental trajectories.

Qualitative interviews with HR leaders and managers supplement the quantitative data and contextualize system acceptance and perceived usefulness. Proactive feedback received from stakeholders was also considered.

Given the exploratory nature of CAMR as a new construct, the study aims to detect practical, directional patterns rather than to estimate causal treatment effects.

### 5.3. Results

**Hypothesis 1:** Employees with initial performance gaps improved over time with the use of CAMR.

**Table. 2**

**Change in Perceived Individual Impact by Impact Cohort under CAMR**

**Week 4-10 Change**

| Impact initially seen as: | | N | Avg. Change | N (improving) | % of ppl improving | Avg. Change (of those improving) |
|---|---|---|---|---|---|---|
| Great | 300's | 71 | -10.4 | 26 | 37% | 13.5 |
| Good, not great | 200's | 40 | 28.0 | 36 | 90% | 33.2 |
| So-So | 100's | 8 | 36.6 | 6 | 75% | 50.2 |
| | **Total** | **119** | **5.7** | **68** | **57%** | **27.1** |

**Week 10-14 Change**

| Impact initially seen as: | | N | Avg. Change | N (improving) | % of ppl improving | Avg. Change (of those improving) |
|---|---|---|---|---|---|---|
| Great | 300's | 99 | 1.5 | 52 | 53% | 7.5 |
| Good, not great | 200's | 31 | 8.9 | 24 | 77% | 9.3 |
| So-So | 100's | 6 | 3.8 | 3 | 50% | 11.4 |
| | **Total** | **136** | **3.3** | **79** | **58%** | **9.4** |

Consistent with H1, 88% of employees whose initial impact scores indicated meaningful gaps and room for improvement demonstrated significant positive upward trends in their time-weighted scores over the following 6 weeks. Improvements were most pronounced in the cohort of „Good, not great“, where 90% (N=40) improved by an average of 33 pts on the 0-360 scale.

Instructively, those who started off with very high perceived impact were largely stable over the course of the study, eliminating the possibility of systemic inflation in ratings or reversion to the mean.

After the initial „jolt of awareness“ (week 4-10), the trend of further changes (week 10-14) suggest stabilization and further improvement.

Anecdotal evidence of improving team cohesion, dramatically lowered turnover, and feedback from interviews with leadership and management aligns with what this data suggests.

**Hypothesis 2: CAMR generates high participation and candid input.**

Participation proved to be high. Within the end of the first week of launch, 120 of the 144 employees had already set their „mirrors“ (i.e. choosing the people whose opinions they wanted). Notably, most employees added dozens of „reflectors“ to their mirrors, creating an ideal environment for stress-testing the CAMR mechanism of continuous micro-reflections.

Under these „stress-test“ conditions, response rates were actually also very high – 84.8% blended average – consistent with H2. Such a response rate was clocked on a very large sample size: 10,146 Impact reflection invitations (85.3% completion) and 2,033 Fulfillment reflection invitations (82.0% completion).

Participation only dropped below the 80% mark in one of the weeks during the evaluation period (during peak holiday season) in late August when it dropped to 72%.

Employees also submitted hundreds of the optional qualitative micro-notes. These offered both superlative and critical upward feedback rarely observed in traditional systems. Leadership noted that they discovered issues that had remained invisible prior to implementing CAMR. Also of note were isolated below-average impact ratings received by powerful managers and leaders, further illustrating the trust employees were placing in the anonymity of the system.

**Hypothesis 3: Managers show increasing acceptance and perceived usefulness.**

Some managers initially expressed uncertainty about anonymous feedback. Some expressed surprise or disappointment by their own initial impact scores. Yet, over the course of the evaluation period, there was increasing comfort and seemingly universal acceptance of the methodology and meaning behind the insights.

Most tellingly, by the end of the evaluation period, the organizational leadership decided to secure a one-year contract for ongoing use of the CAMR system. The below quotes from the HR Leader are instructive:"Never in my career have I had such a consensus on a new initiative amongst my managers. Usually, when we announce a new system or process, there always is one or several people who raise their hand to complain or push back on the idea. Here, when we announced that we'll be using Mirror 360 for the next year, no manager had anything negative to say".

"Several managers said they're excited to use Mirror 360 as a source of real feedback on what's happening between people, teams and on teams"

## 6. Implications for Theory and Practice

### 6.1. Implications for Organizational Learning Theory

The results support a theoretical shift from episodic evaluation toward continuous organizational sensing. CAMR demonstrates that trust, anonymity, and real-time feedback loops can produce insights that traditional systems structurally cannot. Findings suggest that:

- Low-latency sensing improves the visibility of team issues and individuals' impact.
- Anonymity increases candor, especially toward high-power individuals.
- Continuous micro-signals support incremental development rather than episodic judgment.

This moves feedback research toward models rooted in real-time, anonymous data rather than managerial or HR control.

### 6.2. Implications for Human Resource Management Practice

CAMR offers practical benefits for performance-oriented organizations that also seek faster, more actionable insights:

- Early detection of team misalignment and interpersonal tension.
- Improved learning and development for employees who struggle.
- Higher participation and continuous monitoring.
- Less political distortion due to anonymity and standardization.
- Reduced administrative burden on managers and HR departments.

These findings position CAMR as a viable alternative or a much-needed complement to annual reviews and engagement surveys, particularly in dynamic, collaborative, or distributed work environments.

### 6.3. Implications for Technology Adoption

The findings also extend Technology Acceptance Model (TAM) research by demonstrating an inflection pattern: managerial acceptance accelerates once leaders experience the low latency and interpretability of CAMR-generated insights.

This highlights perceived interpretability as a possible new construct influencing acceptance of organizational sensing technologies.

## 7. Limitations, Conclusion, and Directions for Future Research

### 7.1. Limitations

**Several limitations should be noted:**

- The study uses field data without random assignment, limiting causal inference.
- The study is based in the context of a medium-sized organization of ~150 people; usefulness to smaller organizations, and scalability to larger enterprises requires further study.
- The observation window (14 weeks) may not capture long-term effects or behavioral persistence.
- Self-selection bias may influence which organizations choose to adopt CAMR.

These limitations are based on practical limitations and typical of early-stage studies for new organizational technologies.

### 7.2. Conclusion

This study provides empirical evidence that Continuous Anonymous Micro-Reflections (CAMR), implemented via Mirror 360, can address several long-standing limitations of traditional performance evaluation and survey-based systems. In a real organizational setting, CAMR supported measurable developmental trajectories for employees whose initial impact scores indicated performance gaps, generated sustained high levels of participation and candid input, and achieved strong managerial acceptance once leaders experienced the insights in practice.

Taken together, these findings suggest that CAMR is not a marginal improvement of existing practices, but a structurally improved model for organizational sensing. By combining continuous frequency, anonymity through aggregation, standardized prompts, and automated delivery, CAMR creates a feedback environment in which employees can speak honestly with low interpersonal risk and leaders can observe trend-based patterns that are easy to interpret consistently. This combination appears particularly powerful for surfacing invisible issues (including upward feedback about powerful actors), for supporting ongoing self-regulation and learning, and for reducing the political and administrative burden that typically accompany formal review processes.

The results also point to an important shift in the role of feedback in organizations: from a periodic evaluative ritual controlled by managers and HR to an always-on sensing infrastructure that enables real-time learning at individual, team, and system levels. For organizations operating in dynamic, interdependent, or distributed environments, such capabilities are increasingly not optional but foundational. While the present study is exploratory and context-bound, the consistency of the quantitative trends and the convergence with qualitative reports from leaders and employees suggest that CAMR offers a viable path forward for organizations seeking both higher performance and better team alignment.

This paper contributes to the emerging literature at the intersection of feedback, organizational learning, and HR technology by introducing and empirically illustrating the CAMR model. The evidence indicates that when feedback is continuous, anonymous, and low-friction, it becomes more candid, more usable, and more developmentally powerful.

Future research should deepen and extend these findings, but the present results already provide a strong practical signal: organizations can move beyond episodic, politically fraught evaluation systems toward more honest, real-time mirrors of how work is actually experienced and performed.

### 7.3. Direction for Future Research

The exploratory nature of this study points to several important avenues for future research. First, there is a clear need for **longitudinal studies** that examine whether the developmental gains observed in the first 10–14 weeks of CAMR use persist, accelerate, or taper over longer periods. Understanding the temporal dynamics of continuous sensing (how impact, fulfillment, and workplace experience evolve over months or years) would help establish whether CAMR supports durable behavioral improvement or primarily short-lived awareness effects.

Second, future research should investigate the **determinants of qualitative disclosure**. While participation rates were high, qualitative micro-notes -especially in self-reflections – were less frequent. It remains unclear whether this pattern is driven by cultural norms (e.g., reluctance to self-describe strengths/weaknesses), organizational climate, individual differences, or elements of the CAMR design (e.g., time pressure, perceived usefulness of writing). A deeper understanding of when and why employees choose to leave written reflections would inform refinements to the prompting structure and help organizations encourage richer qualitative insight.

Third, a key open question concerns the relationship between CAMR-generated indicators and **objective performance outcomes**. Future studies should examine whether improvements in Impact Scores and Fulfillment Scores predict hard organizational KPIs such as productivity metrics, customer satisfaction,

retention, absenteeism, or team-level output. Establishing such predictive validity would significantly strengthen the case for CAMR as not only a sensing mechanism but a driver of measurable organizational performance.

Finally, future work should explore the **boundary conditions** of CAMR: how it functions in different industries, cultural contexts, power-distance environments, and organizational sizes. Comparative studies of CAMR, annual reviews, and engagement surveys—as well as hybrid models—would provide insight into where CAMR is most effective and how it can complement existing systems.

Together, these research directions can help build a more comprehensive understanding of continuous anonymous micro-reflections as a distinct feedback paradigm, clarifying its developmental mechanisms, organizational impact, and broader applicability.

**References**

1. Colquitt, J. A. (2001). On the dimensionality of organizational justice: A construct validation of a measure. Journal of Applied Psychology, 86(3), 386–400.

2. Edmondson, A. (1999). Psychological safety and learning behavior in work teams. Administrative Science Quarterly, 44, 350–383.

3. Hattie, J., & Timperley, H. (2007). The power of feedback. Review of Educational Research, 77(1), 81–112.

4. Hysong, S. J. (2009). Meta-analysis: Audit and feedback features impact effectiveness on care quality. Medical Care, 47(3), 356–363.

5. Kluger, A. N., & DeNisi, A. (1996). The effects of feedback interventions on performance: A historical review, a meta-analysis, and a preliminary feedback intervention theory. Psychological Bulletin, 119(2), 254–284.

6. Maitlis, S., & Christianson, M. (2014). Sensemaking in organizations: Taking stock and moving forward. Academy of Management Annals, 8(1), 57–125. https://doi.org/10.1080/19416520.2014.873177

7. SHRM. (n.d.). Is the annual performance review dead? Society for Human Resource Management. Retrieved Nov 2, 2025, from https://www.shrm.org/topics-tools /news/employee-relations/annual-performance-review-dead

8. Stone, D., & Heen, S. (2014). Thanks for the feedback: The science and art of receiving feedback well (even when it is off base, unfair, poorly delivered, and frankly, you're not in the mood). New York, NY: Viking. Weick, K. E. (1995). Sensemaking in organizations. Thousand Oaks, CA: Sage.

ISSN (Online): 2815-5084

INTERNATIONAL SCIENTIFIC AND PRACTICAL CONFERENCE ON HUMAN RESOURCE MANAGEMENT
DOI: 10.56065/HRM/2026.153, pp. 153 – 163

7th edition, 3 October 2025
University of Economics-Varna

# Establishing University Artificial Intelligence Centers: A Conceptual Framework for Institutional Transformation in Higher Education

**Bonimir PENCHEV[1], Latinka TODORANOVA[2]**

[1] Department of Informatics, University of Economics – Varna, Varna, Bulgaria, b.penchev@ue-varna.bg

[2] Department of Informatics, University of Economics – Varna, Varna, Bulgaria, todoranova@ue-varna.bg

**JEL: I23, O33, M15**

**Abstract**

The accelerating emergence of Generative Artificial Intelligence (GAI) presents a strategic imperative for higher education institutions to move beyond ad-hoc experimentation toward sustainable institutional frameworks that enhance educational quality, efficiency, and inclusiveness. This paper argues for the establishment of University Artificial Intelligence Centers (UAICs) as a critical mechanism for systemic transformation. Using a conceptual and prescriptive design-based research approach, grounded in a systematic literature review and comparative analysis of existing digital innovation units, the study defines the core structure, functions, and operational models of a UAIC, including technology coordination, pedagogical training, and data governance. Findings suggest that successful integration of GAI in universities requires a centralized, interdisciplinary coordinating body capable of aligning technological implementation with pedagogical goals and ethical data management. UAICs serve as strategic hubs that transform the challenges of AI adoption into opportunities for innovation and institutional capacity building. The novelty of this work lies in presenting a comprehensive conceptual model and actionable governance framework for university-level AI coordination. The proposed blueprint provides practical guidance for academic leaders and policymakers to support strategic investment, ethical implementation, and long-term competitiveness in the AI-driven higher education landscape.

**Key words:**
artificial intelligence, higher education, university centers, accessibility.

**Published by University of Economics – Varna**

*Citation:* Penchev, B., Todoranova, L. (2026). Establishing University Artificial Intelligence Centers: A Conceptual Framework for Institutional Transformation in Higher Education. *Proceedings from 7th International Scientific and Practical Conference on Human Resource Management (ICHRM).* University of Economics – Varna, pp. 153 – 163. DOI: 10.56065/HRM/2026.153

## 1. Introduction

The digital era has fundamentally transformed the way higher education is organized and delivered. The emergence of Generative Artificial Intelligence (GAI) models such as ChatGPT, Copilot, and Gemini has made artificial intelligence (AI) an accessible and widely adopted tool for students and faculty across the globe (Zirenko et al., 2025). At the same time, universities face the pressing challenge of cultivating a culture of responsible and effective AI use within academic contexts.

This has led to an exponential growth in research on the role of Artificial Intelligence (AI) in higher education, covering topics from AI literacy and ethical responsibility to pedagogical strategies and governance policies (Qi et al., 2025; Matiwane & Olaitan, 2025). This body of work underscores the consensus that AI integration requires a structured, institutional response.

A core concept emerging from the literature is AI literacy, defined as the knowledge, skills, and attitudes necessary for effective interaction with AI technologies. Studies confirm that this literacy is a significant predictor of adoption readiness. For example, Qi et al. (2025) leverage the UTAUT (Unified Theory of Acceptance and Use of Technology) model to demonstrate that high levels of "expected usefulness" and "social

influence" drive a greater willingness among students and faculty to utilize AI tools. Conversely, the absence of supporting institutional infrastructure acts as a major inhibitor.

The current understanding of AI, however, remains superficial. Zirenko et al. (2025) found that students often perceive the technology metaphorically as either a "helper" or a "threat," highlighting a lack of deeper understanding. These findings confirm the urgent need for systematic training programs designed to foster critical thinking and ethical responsibility, a function that specialized AI Centers must fulfill.

Furthermore, isolated adoption efforts often prove ineffectiveness. Ghimire and Sharma (2025) reported on the ad-hoc use of GAI tools (like ChatGPT and Grammarly) in language teaching in Nepalese universities. They concluded that while tools facilitate instruction, the lack of institutional training and methodological support leads to inconsistent efficacy and shallow application. This clearly establishes the need for coordination structures and methodical support, a critical role envisioned for the UAIC's pedagogical pillar.

The literature uniformly agrees that technological integration without a strong ethical framework is unsustainable. Nartey (2025) proposes key principles for the responsible use of GAI in teaching: transparency, informed consent, content validity, and academic integrity. These principles collectively outline the ethical framework that future centers must institutionalize.

This necessity is reinforced by research into organizational success factors. Matiwane and Olaitan (2025) identify several "critical success factors" for sustainable AI integration, which include: availability of faculty training, robust technological infrastructure, executive leadership support, and inter-institutional collaboration. Their analysis concludes that strong institutional capacity is the determining factor for the durability of digital transformation efforts.

Moreover, the scope of AI extends far beyond the classroom. Tiika et al. (2025) emphasize AI's essential role in university administrative management—from automated document processing and student data analytics to resource optimization. They recommend the creation of interdisciplinary teams to manage the deployment of AI policies, directly supporting the need for the UAIC's central coordinating Governance Hub. The literature also highlights equity concerns. Austria et al. (2025) found that the lack of targeted training and dedicated funding creates a major barrier to uniform development across different university types (public vs. private), confirming the necessity of a centralized structure to ensure equitable access and support.

The strategic challenge posed by data management, especially within the academic publication landscape, requires more than just policy. It demands advanced algorithmic solutions. The UAIC is thus envisioned as a hub for supporting and facilitating applied AI research that addresses pressing institutional needs, such as verifiable data for accreditation reports.

This crucial area of application is the subject of recent work by Bankov et al. (2025) focusing on bibliometric data management: "The integration of artificial intelligence (AI) models into academic publication management systems presents a promising solution to the difficulties of structuring composite data, manually input by authors and records retrieved from application programing interfaces (API). Current systems face barriers in accurately matching records from diverse scientific databases, such as Scopus or Web of Science, leading to inefficiencies and inaccuracies."

The integration of such specific, high-impact research (which may involve complex models and similarity metrics) is essential for boosting both the accuracy and scalability of institutional data management. Finally, the literature connects these technical efforts to global responsibility. Goyal et al. (2025) link the development of university AI policies to the realization of Sustainable Development Goals (SDG 4, 9, and 17), while Chen et al. (2025) specifically address the need to account for the energy footprint of AI infrastructure, reinforcing the sustainable and ethical mandate of the UAIC.

Against this backdrop, the main objective of the present study is to propose the establishment of University Artificial Intelligence Centers (UAICs) in Bulgarian higher education institutions. These centers are envisioned as strategic units dedicated to researching, implementing, and supporting the practical application of AI technologies in teaching, learning, and academic management.

Such centers would provide a structured environment for:

- assisting faculty, students, and administrative staff in the effective use of AI applications;

- developing intelligent solutions that enhance the quality of education and institutional governance;
- fostering innovation and building new competencies in digitalization and knowledge management.

A fundamental mandate for all higher education institutions is the continuous improvement of educational quality — a process in which technological innovation plays a decisive role. As articulated by Sulova and Hristova (2025), „Improving the quality of education is a key priority for higher education institutions, with technological innovations playing a crucial role in this process. In the era of digitalization, universities are increasingly integrating modern technological solutions that facilitate communication between students, faculty, and administration.“ However, the accelerated adoption of GAI has introduced a complex layer of challenges, notably concerning data governance, intellectual property, and ethical oversight—issues that traditional digital administration structures are ill-equipped to handle. The establishment of dedicated UAICs is thus not merely a matter of technological support, but an imperative for institutional compliance and risk mitigation.

In Bulgaria, although most universities employ Learning Management Systems (LMS) such as Moodle, the integration of Artificial Intelligence (AI) into teaching, research, and administration remains fragmented and inconsistent. There is a clear lack of institutionalized structures to support academic staff in learning about and adopting AI tools in their educational practices.

Nevertheless, several universities have undertaken targeted initiatives to advance the research, education, and institutional application of AI. Sofia University „St. Kliment Ohridski“ stands at the forefront with its two national centers of excellence — INSAIT (Institute for Computer Science, Artificial Intelligence and Technology) and GATE (Big Data for Smart Society) — both recognized as key drivers of AI research, innovation, and policy development. The New Bulgarian University (NBU) integrates AI through interdisciplinary programs in computer science, business, and the arts, and hosts regular international conferences connecting AI innovation with educational practice. The Technical Universities of Sofia and Varna have established degree programs and laboratories in Artificial Intelligence, robotics, and data science, emphasizing applied and engineering dimensions of AI.

The Nikola Vaptsarov Naval Academy (Varna) has recently launched a bachelor’s program in Artificial Intelligence and Smart Technologies and is developing a Regional Innovation and Education Center with an AI-equipped campus, emphasizing the role of AI in navigation, marine safety, and autonomous systems. Similarly, the University of National and World Economy (UNWE) has established an Institute for Artificial Intelligence in Economics, dedicated to research in data analytics, machine learning, and AI-driven decision support systems for business and public policy.

The Angel Kanchev University of Ruse also plays a significant role in Bulgaria’s AI research landscape as one of the ten nationally designated research universities, supported through targeted government funding for excellence in science and innovation. Within this framework, the university has launched several initiatives addressing artificial intelligence, cyber-physical systems, and educational technologies. Its Centre for Innovative Educational Technologies actively explores the pedagogical applications of AI, organizing webinars and collaborative projects on the use of ChatGPT, large language models, and adaptive learning environments in higher education. Moreover, the university hosts international academic events such as AI Camp and the MAI4CAREU project, aimed at fostering digital competencies and promoting AI literacy among students and faculty across Europe.

The American University in Bulgaria (AUBG) promotes responsible and ethical AI use through initiatives such as AI Aware Universities and student-led innovation labs, while offering courses in Artificial Intelligence Programming and Machine Learning. Similarly, the South-West University „Neofit Rilski“ (Blagoevgrad) has incorporated AI components into its programs on data science and intelligent systems and participates in national projects aimed at strengthening AI literacy and digital skills across higher education. These efforts contribute to building a more inclusive and geographically balanced AI innovation network within the Bulgarian academic landscape.

In addition, St. Cyril and St. Methodius University of Veliko Tarnovo (VTU) has been developing AI-related initiatives with a strong focus on education and the humanities. Through projects such as Digital Skills

for Educators and AI for Humanities, the university promotes the integration of AI tools into teacher training and digital pedagogy. Its Faculty of Mathematics and Informatics offers courses in Artificial Intelligence, Machine Learning, and Computational Linguistics, while the Centre for Continuing Education provides professional development workshops on AI-supported teaching methods. These efforts highlight the growing importance of human-centered AI literacy beyond technical disciplines, reinforcing the need for institutional frameworks capable of linking pedagogical innovation with ethical and technological advancement.

The University of Economics – Varna (UE–Varna) stands out as one of the leading institutions actively developing e-learning and digital academic innovation. In this context, the establishment of an AI Center at UE–Varna is viewed as a strategic step toward creating a sustainable academic model for digital innovation, aligning institutional capacity with the demands of AI-driven transformation in higher education.

Collectively, these initiatives reveal a national trend toward institutionalizing AI capacity within Bulgarian higher education. They demonstrate a shared understanding that sustainable AI adoption requires not only technical expertise but also structured organizational support, ethical governance, and interdisciplinary collaboration. This evolving ecosystem provides a fertile foundation for coordinated frameworks such as the proposed University Artificial Intelligence Centers (UAICs), which can consolidate these dispersed efforts into a cohesive national network for responsible and innovative AI integration in academia.

## 2. Strategic Development of University AI Centers in Education

### 2.1. Aligning UAICs with UNESCO's Guidance for Generative AI in Education

The Integrated-Pillar Model for Responsible AI Transformation (IP-RAIT) is fundamentally anchored in the international call for ethical and governed digitalization in education. Specifically, the model operationalizes the core mandates set forth by UNESCO's Guidance for Generative AI in Education (2023)[1]. These mandates stem from the organization's commitment to the Education 2030 Agenda and Sustainable Development Goal 4 (SDG 4)—ensuring inclusive and equitable quality education.

While the vision for quality education is constant, the rapid adoption of GAI creates a novel landscape of contradictions and risks. The diffusion of tools such as ChatGPT has outpaced the adaptation of national regulatory frameworks, creating inevitable tensions between innovation, ethics, and governance. UNESCO's guidance explicitly calls for a human-centered approach – technology must serve pedagogy, not replace it and it must enhance human judgment rather than undermine it.

This regulatory framework follows a coherent three-tier logic, which forms the backbone of the UAIC's functional design:

- Immediate Actions: Setting minimum standards for transparency, data protection, and ethical vetting of AI tools.
- Medium-term Institutional Policies: Validating AI systems for pedagogical relevance and establishing concrete risk assessment procedures.
- Long-term Capacity Building: Developing AI competencies among teachers and students, strengthening research infrastructure, and ensuring sustainability.

All dimensions align with the overarching goal of ensuring that GAI contributes to SDG 4 without deepening existing inequalities. This tripartite logic underscores the necessity for universities to institutionalize AI through centralized structures with clear mandates, accountability, and governance.

The first major theme in UNESCO's recommendations concerns governance and ethics. The organization advocates an „ethics-by-design" approach and traceability, requiring that every educational use of GAI ensure data provenance, model explainability (as far as feasible), clear labeling of generated content, and robust mechanisms for human oversight. Without such safeguards, risks such as bias, misinformation, and copyright

[1] Guidance for generative AI in education and research, https://www.unesco.org/en/articles/guidance-generative-ai-education-and-research <Accessed: 10.10.2025>

violations directly compromise academic integrity.

In higher education, this translates into the need for formal, internal validation procedures for GAI tools prior to adoption, followed by continuous pedagogical monitoring after implementation. Such functions naturally form the core of the UAIC's Central Governance Hub, where centralization minimizes risks and ensures proactive compliance with frameworks such as the GDPR and the forthcoming EU AI Act.

The second key focus of the UNESCO report involves the competencies of teachers and students. The AI Competency Framework for Teachers structures 15 competencies across five dimensions: human-centeredness, ethics, foundations and applications of AI, AI pedagogy, and professional development.

The normative strength of this framework lies in its didactic translation: how universities integrate these competencies into courses, assignments, and assessment strategies. This requires internal expertise in AI-based instructional design and capacity-building programs for educators that go beyond technical proficiency to address ethical dilemmas, authorship, evidence validity, and equitable access. As the literature suggests, the experience of institutions attempting this shows that without a sustainable central unit, training remains fragmented and short-lived in its impact.

Furthermore, it is essential to prevent the use of GAI in contexts where it would deprive learners of opportunities to develop cognitive, social, and critical thinking skills through experience, dialogue, and reasoning. While universities regularly update curricula evaluated by the National Evaluation and Accreditation Agency (NEAA), UNESCO emphasizes the urgent need to design AI-focused curricula that encompass both ethical dimensions and the practical skills for responsible, creative use of AI tools. This necessity, in turn, drives the need for structured faculty training frameworks.

The third priority concerns inclusion and sustainability. UNESCO warns that GAI may exacerbate „digital poverty“—gaps in tool quality, linguistic coverage, and access to computational resources. Institutions are therefore urged to organize AI access as a public good. For instance, this could involve developing shared services for transcription and captioning, creating localized Bulgarian-language datasets through Retrieval-Augmented Generation (RAG), and selecting infrastructure that considers energy efficiency and carbon footprint.

As Nacheva (2025) notes, "Accessibility in higher education is crucial for inclusivity, equity, and diversity of learning opportunities." A centralized UAIC represents the most natural mechanism to balance quality, cost, and equitable access between localized solutions and global cloud-based platforms.

These considerations logically lead to the proposal for establishing University Artificial Intelligence Centers (UAICs). Not all instructors and students are equally ready to adopt AI at the same pace or depth, hence, a dedicated institutional structure is needed to support this process through training, experience sharing, and methodological guidance—all functions naturally performed by a UAIC.

Table 1 summarizes the main themes of the UNESCO report, its key recommendations, and their relationship to the proposed UAIC functions.

**Table 1**

**Alignment of UAIC Functions with UNESCO Recommendations for GAI in Higher Education**

| Thematic Area | UNESCO Recommendation | Role of the UAIC |
|---|---|---|
| **Regulation and Ethics** | The guidelines call for the introduction of ethics-by-design and the application of a human-centered approach. | The UAIC is proposed as the structure introducing ethics-by-design and ensuring compliance with the AI Act and GDPR. It foresees an Ethics/Legal expert and an AI Governance Board. |
| **Pedagogical Validation** | Institutions must validate GAI systems for pedagogical relevance and safeguard the human component. | The UAIC will develop a catalog of approved tools and processes for DPIA/AI risk assessment. The Center insists on hybrid feedback (AI + human) and human oversight. |
| **Capacity and Skills** | Capacity building is necessary for teachers and researchers for the proper and ethical use of GAI. | The UAIC will employ instructional designers (AI-pedagogues) to conduct training for faculty and support the co-design of assignments. |

| Thematic Area | UNESCO Recommendation | Role of the UAIC |
|---|---|---|
| **Inclusivity/Language** | Policies must promote inclusivity, equity, and linguistic/cultural diversity (e.g., using local languages). | The UAIC foresees accessibility/UDL specialists and utilizes AI assistants with a local corpus (RAG). Structural integration with e-learning centers can offer shared services like transcriptions and subtitles, supporting inclusive use as recommended by UNESCO. |
| **Research** | It is necessary to review the long-term implications of GAI for knowledge and scientific research. | The UAIC has functions for Science and Innovation, including PhD programs and interdisciplinary laboratories, which is key for developing local research capacity and building an evidence base, as recommended by UNESCO. |

*Source: Authors' Compilation.*

The alignment outlined in Table 1 demonstrates that the functions of the proposed University Artificial Intelligence Center (UAIC) directly operationalize UNESCO's policy vision for Generative AI in education. Each thematic area—ethics, pedagogy, capacity building, inclusion, and research—is translated into a concrete institutional mechanism that transforms abstract global principles into actionable academic practice. In this sense, the UAIC functions not only as an administrative or technical entity, but as a governance bridge between international normative frameworks and the everyday realities of teaching, learning, and research within higher education institutions.

More importantly, this alignment highlights that the sustainable adoption of AI requires both vertical integration—embedding ethical and regulatory compliance across all levels of decision-making—and horizontal coordination, ensuring collaboration among academic departments, IT units, and policy offices. The UAIC thus represents an institutional embodiment of UNESCO's call for human-centered, transparent, and equitable AI ecosystems, creating the structural conditions through which universities can simultaneously safeguard academic integrity and accelerate digital innovation.

This structured alignment not only operationalizes UNESCO's global vision but also provides a contextual foundation for national adaptation. In the Bulgarian higher education landscape, such an institutional mechanism would ensure that global ethical and pedagogical standards are translated into locally actionable policies, bridging the gap between international guidance and domestic implementation.

### 2.2. Conceptual model of a University Artificial Intelligence Center (UAIC)

The structural necessity of the University AI Center (UAIC) is further validated by established models of technology adoption. Qi et al. (2025) apply the Unified Theory of Acceptance and Use of Technology (UTAUT) model to higher education environments, demonstrating that a supportive institutional culture and adequate technological infrastructure significantly increase the likelihood of faculty adopting AI tools.

Consequently, University Artificial Intelligence Centers (UAICs) can be interpreted as structural facilitating conditions within the UTAUT framework – providing the essential resources, targeted training, and vital social support that enhance the probability of technology acceptance among educators and researchers.

The concept of the UAIC represents the „missing organizational layer" required to institutionalize the responsible and effective use of Generative AI (GAI) in Bulgarian universities. By integrating ethics, pedagogy, and technology within a single centralized entity, the UAIC establishes mechanisms for human oversight, traceability, transparency, and validation—the very principles that UNESCO identifies as essential for ensuring a human-centered and trustworthy digital future for education and science.

In the contemporary academic ecosystem, a university's competitiveness is increasingly defined by its ability to manage, analyze, and extract value from research data. This strategic imperative is underscored by Azeroual et al. (2025): „Ensuring the usability of the growing volumes of data is critical to competition and provides crucial and decisive growth drivers not only in business but also in research. To do this, research information must be processed, analyzed and used."

The proposed UAIC directly addresses this challenge through its Coordination and Governance function. By establishing a centralized mechanism for data governance, the UAIC ensures that research information is processed in accordance with ethics-by-design principles and adheres to rigorous standards

of transparency, traceability, and quality assurance. This institutionalization of processes not only strengthens the scientific credibility and reproducibility of research outcomes but also transforms data into a strategic institutional asset—a key determinant of competitiveness, research funding success, and partnership opportunities.

Ultimately, the UAIC model positions the university to sustain long-term academic integrity, data-driven innovation, and global research visibility, thereby aligning technological advancement with ethical governance and strategic development goals.

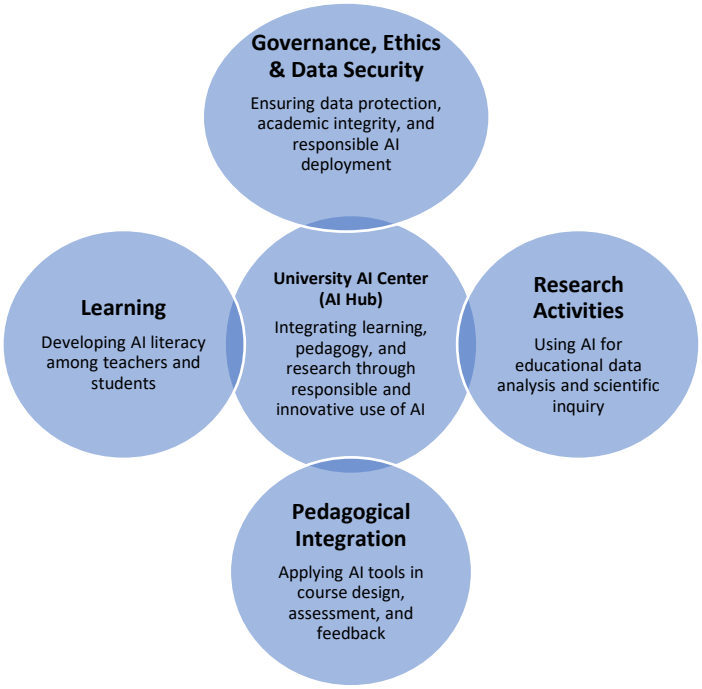



**Fig. 1. Conceptual model of a University Artificial Intelligence Center**

*Source: Authors' Compilation*

Following the conceptual model presented in Figure 1 (The IP-RAIT Model), the development of a University Artificial Intelligence Center (UAIC) is understood as a staged and iterative process that gradually builds institutional capacity for responsible and innovative AI adoption in higher education. The conceptualization of the UAIC encompasses several key phases, each addressing a distinct dimension of competence, infrastructure, and innovation within the university environment (Table 2).

**Table 2**

**Phased Development of the UAIC**

| Stage | Focus | Description |
|---|---|---|
| **Stage 1: Preparatory Phase** | Building Competence and an Ethical Framework | The initial focus lies on developing AI literacy among faculty and students, emphasizing understanding of fundamental principles, limitations, and ethical aspects of AI. The goal is to create a shared culture and establish common standards for responsible use across the institution. |
| **Stage 2: Institutional Phase** | Developing Infrastructure and Governance Mechanisms | The UAIC is formally established as an interdisciplinary structure. The focus shifts to developing the necessary technological infrastructure, ensuring data security, and formalizing governance mechanisms for coordinating all AI-related activities. |
| **Stage 3: Innovation and Research Phase** | The UAIC as an Innovation Laboratory | The Center functions as a dynamic laboratory aimed at transforming AI from a mere tool into a catalyst for educational and research innovation. It facilitates experimental projects that integrate AI into teaching practices, assessment, and scholarly inquiry, promoting a culture of data-driven and ethically informed experimentation. |

| Stage | Focus | Description |
|---|---|---|
| **Stage 4: Evaluation and Sustainability** | Continuous Improvement and Strategic Alignment | The final phase involves evaluating the outcomes of the UAIC's activities, defining measurable indicators of impact, reviewing ethical compliance, and aligning the Center's evolution with institutional and national digital transformation strategies. |

*Source: Authors' Compilation*

The contemporary higher education landscape operates within the VUCA paradigm—volatility, uncertainty, complexity, and ambiguity. To successfully navigate the rapid emergence of Generative AI, the UAIC must be designed as an agile organization capable of fostering radical innovation while maintaining stable governance.

This dual capacity for organizational ambidexterity – the ability to pursue both incremental (exploitation) and disruptive (exploration) innovation – is structurally supported through flexible models. One such proven approach is the „Skunk Works" model, which provides an organizational blueprint for innovation under conditions of uncertainty (Ivanova & Antonova, 2022). It is characterized by:

- Flexible, Cross-Functional Teams tasked with addressing specific, high-impact challenges or pursuing high-risk, high-reward innovations.
- Rapid Decision-Making Processes that operate outside the constraints of traditional academic bureaucracy.

By adopting a „Skunk Works" philosophy within its Research and Innovation domain, the UAIC ensures that the human factor—creativity, critical thinking, and ethical design – remains central to AI integration. This structure allows the Center to rapidly pilot new AI tools, ethical frameworks, or pedagogical approaches, evaluate their outcomes, and scale the most successful practices across the broader university ecosystem. In doing so, the UAIC embodies the principle of rapid yet responsible adaptation to technological change.

The University of Economics – Varna (UE–Varna) provides a suitable institutional context for applying the IP-RAIT model. The university already possesses a well-functioning Center for E-Learning and Distance Education (CEDE), which collaborates with the Department of Information Technologies to ensure robust technological infrastructure. This unit currently maintains and develops the digital environment that supports real-time electronic communication and manages the unified digital environment for all forms of education.

This established experience in online and distance education provides a solid foundational infrastructure for the acceptance of innovations in teaching, particularly those involving AI. At present, many instructors at UE–Varna already utilize AI tools individually (e.g., for generating test questions, analyzing texts, or creating assignment ideas). However, these efforts remain fragmented and lack institutional coordination.

Establishing a UAIC would allow UE – Varna to systematize AI literacy training, develop internal ethical and operational standards, and stimulate interdepartmental collaboration and joint research on AI-enhanced teaching and learning. A practical first step, aligning with the preparatory phase, could involve forming a Digital Pedagogy and AI Task Force that includes representatives from academic departments, the IT division, and the Student Council. This team could lay the groundwork for a fully operational UAIC with dedicated staff and sustainable funding, potentially supported by national or European programs.

### 2.3. Future Directions: Strategic Recommendations for AI Integration

Building upon the theoretical framework (IP-RAIT) and the conceptual model developed in this study, several key recommendations can be formulated to guide Bulgarian higher education institutions in integrating Artificial Intelligence into their academic and research ecosystems. These directives aim to promote sustainable institutional transformation and ensure alignment with international standards for responsible AI adoption in education.

1. Formal Institutionalization of AI Coordination

Each university must formally include in its strategic development plans a dedicated unit or center responsible for coordinating the integration of AI into teaching, learning, and research activities. Establishing such structures ensures organizational accountability, facilitates cross-departmental

coordination, and enables the systematic implementation of AI-related policies. The University AI Center (UAIC) model provides a blueprint for how universities can transition from fragmented experimentation to a coherent institutional framework that embeds AI within their core academic mission.

2. Development of AI Literacy as a Core Academic Competence

AI literacy must be recognized as a fundamental competence for both educators and students, extending beyond technical proficiency. This literacy must encompass ethical awareness, critical evaluation of AI-generated content, and understanding of algorithmic limitations and biases. Integrating mandatory AI literacy training into professional development programs and curricula will empower faculty and students to use AI tools effectively, responsibly, and creatively.

3. Fostering Interdisciplinary Collaboration

Successful AI adoption in higher education requires the convergence of expertise from diverse disciplines—including computer science, pedagogy, economics, psychology, and law. University AI Centers should therefore be designed as interdisciplinary hubs that connect technical knowledge with pedagogical innovation and ethical reflection. This holistic approach, as embodied by the IP-RAIT model's overlapping pillars, ensures that AI technologies are applied in ways that enhance learning outcomes, support equity, and uphold academic integrity.

4. Creation of a National Network of University AI Centers

To strengthen collective capacity and ensure consistent ethical and quality standards across the sector, Bulgarian universities should collaborate in forming a national network of UAICs. Such a network would facilitate the essential exchange of good practices, joint research initiatives, and policy alignment with European and UNESCO frameworks for AI in education. It would also create a robust platform for benchmarking institutional progress and fostering cooperative innovation across the national academic landscape.

5. Ensuring Sustainable Funding and Support

Long-term success in integrating AI depends on securing stable financial and institutional support. Universities must actively leverage funding opportunities from national innovation funds and European programs such as Horizon Europe, Digital Europe, and Erasmus+ to sustain research, training, and infrastructure development. Crucially, sustainable investment in human capital—particularly in AI competence-building for academic staff—must be a central, continuous element of this strategic financial planning.

Collectively, these recommendations form a roadmap for Bulgarian universities to transition toward ethically governed, data-informed, and innovation-oriented higher education ecosystems.

## 3. Conclusion

The integration of artificial intelligence into higher education is no longer a matter of choice, but a strategic necessity. Universities can no longer treat AI merely as a technological tool; they must recognize it as an essential institutional competence. The establishment of University AI Centers (UAICs) represents the logical step in this direction—providing the necessary infrastructure, expertise, and organizational culture required for the transition toward intelligent and data-informed education.

The example of the University of Economics – Varna (UE–Varna) demonstrates that even institutions with well-developed e-learning systems require a centralized framework to coordinate and guide the efforts of faculty and students toward the effective and ethical use of AI. A university-level AI center ensures coherence between pedagogical innovation, research, and digital governance, transforming isolated experimentation into a systematic and sustainable practice.

The proposed conceptual model, the Integrated-Pillar Model for Responsible AI Transformation (IP-RAIT), outlines a clear pathway from individual technological initiative to institutional transformation—moving from fragmented practices to a coherent culture of AI literacy, ethical awareness, and innovation. By embedding AI education and governance within the university's strategic agenda, higher education institutions can evolve into adaptive, learning organizations capable of navigating the complexities of the

digital age.

In the long term, University AI Centers can become a key factor in enhancing the competitiveness and resilience of Bulgarian higher education – not merely through technological modernization, but as a strategic investment in human capital, academic integrity, and intellectual autonomy. Through this transformation, universities will be better positioned to fulfill their mission as engines of knowledge creation, innovation, and societal progress in the era of artificial intelligence.

**Acknowledgments**

This research was funded by the NPI-65/2023 project "Artificial Intelligence to Help People with Disabilities in Ensuring Digital Accessibility in the Higher Education Learning Process".

**References**

1. Adewusi, M. A., Ainebyoona, C., Odekeye, O. T. & Ngoma, M. (2025). AI in Universities: The Good, the Bot, and the Ugly Truths. https://doi.org/10.21203/rs-6883202/v1.

2. Azeroual, O., Nacheva, R., Nikiforova, A., Störl, U. (2025) A CRISP-DM and Predictive Analytics Framework for Enhanced Decision-Making in Research Information Management Systems. *Informatica : An International Journal of Computing and Informatics, Ljubljana : Slovenian Society Informatika*, 49 (18), 67-86. https://doi.org/10.31449/inf.v49i18.5613

3. Chen, X., Wang, X., Colacelli, A., Lee, M. & Xie, L. (2025). Electricity Demand and Grid Impacts of AI Data Centers: Challenges and Prospects. arXiv Preprint. https://doi.org/10.48550/arXiv.2509.07218.

4. Bankov, B., Parusheva, S., Marinova, O., Strashimirova, P., Petkova, D. Academic Profile Management: Benchmarking DeepSeek-R1 for Publication and Citation Data. *Flexible Query Answering Systems : 16th International Conference : FQAS 2025, Burgas, Bulgaria, September 11-13, 2025 : Proceedings, Cham, Switzerland : Springer Publ.,* 2026, 103-114. https://doi.org/10.1007/978-3-032-05607-8_11

5. Ghimire, P. R. & Sharma, M. (2025). Exploring University Teachers' Experiences in Integrating Generative AI and AI Tools in English Language Teaching and Learning in Rupandehi. Journal of NELTA Gandaki, 8 (1–2).

6. Goyal, N., Shukla, B., Rathore, J. S. & Goel, N. (2025). Accelerate Universities' Role for the Implementation of the UN SDGs 2030: Synergizing AI and Human Intelligence. In book: *Viksit Bharat@2047: Transformative Role of AI for Sustainable Business Innovation and Global Economy*. https://doi.org/10.62823/Inspira/2025/9788199024557/09

7. Ivanova, P. & Antonova, K. The Skunk Works approach: an innovative solution for human resources management. *Human Resource Management International Scientific-Practical Conference Organized by the University of Economics – Varna 30 September 2022.* 93-103.

8. Matiwane, B., & Olaitan, O. (2025). Critical Success Factors for Integrating AI Tools into University Curricula for Workforce Readiness. *International Journal of Learning, Teaching and Educational Research,* 24 (8), 91-111. https://doi.org/10.26803/ijlter.24.8.5

9. Nacheva, R. (2025) Analysis of AI Mobile Applications for Ensuring Digital Accessibility in Higher Education for People with Disabilities. *Acta Educationis Generalis*, 15(1), 133-145. https://doi.org/10.2478/atd-2025-0009

10. Nartey, E. K. (2025). Generative AI in Higher Education: Guiding Principles for Teaching and Learning. *Journal of Teaching and Learning,* 19 (3), pp. 245–249. https://doi.org/10.22329/jtl.v19i3.9756

11. Qi, Y., Zhou, C. & Zhang, H. (2025). Bridging AI Literacy and UTAUT Constructs in Higher Education. *Humanit Soc Sci Commun*, 12, 1452. https://doi.org/10.1057/s41599-025-05775-y

12. Sulova, S. & Hristova, I. (2025) Enhancing the Quality of Education Through the Implementation of an Intelligent Tutoring System. *Flexible Query Answering Systems : 16th International Conference : FQAS 2025, Burgas, Bulgaria, September 11-13, 2025 : Proceedings, Cham, Switzerland :*

*Springer Publ*., 2026, 145-154. https://doi.org/10.1007/978-3-032-05607-8_15

13. Tiika, R., Owusu, J. & Mensah, F. (2025). The Role of AI in Shaping the Discharge of Duties of University Administrators. *Journal of Education and Learning Technology (JELT)*, 6 (8), 629 – 641. https://doi.org/10.38159/jelt.2025689

14. Zirenko, M., Machura, I. A., Fabriz, S., Schulze-Vorberg, L. & Horz, H. (2025). AI and Learning with AI: University Students' Metaphorical Conceptualizations. *Journal of Interactive Media in Education*, 1, 1–14. https://doi.org/10.5334/jime.994

ISSN (Online): 2815-5084

INTERNATIONAL SCIENTIFIC AND PRACTICAL CONFERENCE ON HUMAN RESOURCE MANAGEMENT
DOI: 10.56065/HRM/2026.164, pp. 164 – 171

7th edition, 3 October 2025
University of Economics-Varna

# Barriers to Green Job Creation in Bulgarian Agriculture

**Daniel PETROV**[1]

[1] PhD student (Department of Economics and Management of Agricultural and Rural Organizations), Institute of Agricultural Economics – Sofia, Sofia, Bulgaria, dpetrov.iae@gmail.com

**JEL: J21, Q18, Q56, O13**

**Abstract**

This paper explores the critical barriers hindering the development of green jobs in Bulgaria's agricultural sector, within the framework of the European Green Deal and the Common Agricultural Policy (2023–2027). Using a theoretical and policy-based methodology, the study examines six major strategic documents and applies expert interpretation to reveal the systemic nature of constraints obstructing green employment. Two hypotheses are tested and confirmed: first, that institutional and regulatory ambiguity surrounding the concept of „green jobs" inhibits effective policy-making; and second, that the absence of integrated education and training infrastructures prevents sustainable labor transformation in agriculture, especially in rural and marginalized areas. The results demonstrate a persistent disconnect between European strategic goals and national operationalization, further exacerbated by outdated curricula, fragmented governance, and lack of territorial connectivity. The paper argues for an integrated national model that combines legal definitions, education reform, employment policy, and regional development to foster green employment in agriculture. The study contributes an original typology of barriers and lays the groundwork for future interdisciplinary research in the field of sustainable rural employment.

**Key words:**
Green jobs, Agricultural policy, Rural, development, Institutional barriers, Sustainable employment

**Published by University of Economics – Varna**

*Citation:* Petrov, D. (2026). Barriers to Green Job Creation in Bulgarian Agriculture. *Proceedings from 7th International Scientific and Practical Conference on Human Resource Management (ICHRM).* University of Economics – Varna, pp. 164 – 171. DOI: 10.56065/HRM/2026.164

## 1. Introduction

Although the European Union has long defined the green economy as a structural framework for the future of work, the creation of green jobs in Bulgaria's agricultural sector remains marginalized both in political strategies and in public or academic discourse. Within the context of the European Green Deal (European Commission, 2019), the Farm to Fork Strategy, and the new Common Agricultural Policy (CAP) for the period 2023–2027, the green transition is no longer an alternative vision but a regulatory and economic necessity requiring a comprehensive transformation of production, consumption, and employment models. Despite this, the shift toward green employment in Bulgarian agriculture is significantly hindered by structural deficits related not only to limited resources but also to the absence of strategic vision, institutional coordination, and functional human capital capacity. While this issue is not new to Bulgaria's economic development, it manifests acutely in the agricultural sector, where multiple vulnerabilities intersect: regional inequalities, an aging workforce, low education levels, limited innovation culture, and a near-total absence of interventions for green skills development (Ministry of Agriculture, 2023). In this context, „green jobs" are not merely any activity linked to environmental sustainability, but specific professional roles within the agricultural system that require new knowledge and competencies related to soil preservation, resource efficiency, circular farming, organic production, bioenergy, agroecology, and climate-adaptive agriculture. Herein lies a fundamental paradox—on one hand, European strategic documents offer a wide array of tools

to support the green transition, including funding via the CAP Rural Development Programme, NextGenerationEU, and the European Social Fund+, yet on the other hand, at the national and especially local level, there is a chronic incapacity to operationalize these instruments in ways that generate sustainable rural employment. Statistical data corroborate this claim—by 2022, less than 5% of newly created jobs in the agricultural sector in Bulgaria could be classified as green (Eurostat, 2023), and the term itself is inconsistently or rarely used in national statistics. This results in a paradoxical situation: despite vast labor potential and geographic coverage, agriculture in Bulgaria remains largely disconnected from prevailing innovation and sustainability trends. Instead of serving as an incubator for green innovation and modern employment, the agrarian system continues to operate within post-socialist production cultures that reproduce low-skilled and often precarious labor relations.

This, in turn, generates a vicious cycle—lack of innovative employment leads to outmigration, demographic decline, and depletion of human capital, which further undermines any effort toward transformation. A significant institutional vacuum also exists—neither the Ministry of Agriculture nor the Ministry of Labor and Social Policy have operational programs that specifically address the green labor transformation in agriculture. Programs for young farmers (Measure 6.1) and investment support for agri-environmental practices are not linked to clearly defined professions or mechanisms for long-term employment creation. Instead, they support projects that often function as short-term subsidy schemes without capacity-building effects. From a territorial development perspective, rural regions remain weakly connected to innovation hubs and educational infrastructure, further limiting access to training and green skill acquisition. This generates a critical structural deficit—the agricultural economy fails to generate enough new green positions, while the labor market lacks qualified individuals with competencies in sustainable agriculture. This is not merely an economic deficiency, but a strategic one, as it undermines Bulgaria's ability to engage effectively in climate adaptation processes and to comply with increasingly stringent regulatory demands on carbon emissions, biodiversity, and resource management. While other EU member states are developing national frameworks for green skills and establishing sectoral councils for the green transition, Bulgaria still lacks even a basic methodology for identifying and tracking green jobs in the agricultural sector. This lack of strategic framing and operationalization of the concept leads to policy inefficiency, misalignment between education and labor market needs, and missed opportunities for local economic development.

The aim of this study is to identify and analyze the key barriers preventing the development of green jobs in Bulgaria's agricultural sector through a theoretical and policy-oriented review of existing documentation and regulatory frameworks, combined with expert interpretation of structural deficits. The research centers on two interrelated hypotheses—first, that institutional and regulatory ambiguity surrounding the concept of „green jobs" is a central factor inhibiting effective policy development; and second, that the current educational and training infrastructure fails to meet the needs of the green transition in agriculture.

## 2. Literature Review and Hypotheses Development

According to Aifuwa (2020) and Aifuwa, Saidu, Enehizena and Osazevbaru (2019), sustainability reporting is a blend of two concepts: „sustainability" and „reporting". Sustainability, as defined by Brundtland (1987), is meeting the needs of the current generation without compromising the ability of the next generations to meet their own needs. Reporting means disclosing an organisation's information fully or partially to stakeholders (Aifuwa, 2020). Therefore, sustainability reporting is disclosing organisational information about its daily economic, social and environmental activities as it affects the society and stakeholders where it operates. Global Reporting Initiative [GRI] (2019) defined sustainability reporting, performance or disclosure as the process whereby organisations provide information about the economic, environmental and social impact caused by its everyday activities. Flowing from the GRI definition on sustainability reporting, visibly, there are enormous benefits to be derived from disclosing economic, social and environmental issues. Aifuwa et al. (2019) opined that the benefits of sustainability reporting include better financial performance, improved firm reputation, the attraction of better investors and high morale among employees.

The topic of green jobs has been intensively developed in international literature since the early 21st century as part of the broader paradigm of sustainable development, the circular economy, and the ecological

transformation of labor markets. The concept of "green jobs" finds its roots in the frameworks proposed by the International Labour Organization (ILO, 2008), which defines such positions as those contributing to the preservation or restoration of the environment through reducing energy and raw material consumption, limiting emissions and pollution, and protecting ecosystems. In the agricultural context, this includes not only organic farming but also activities related to agroecology, sustainable management of water and soil, precision agriculture, and bioenergy production (UNEP, 2011; OECD, 2021). The theoretical foundations of green jobs are closely linked to the economics of the green transition, the economics of sustainable development (Barbier, 2010), as well as theories of "sustainable work" (Schulz & Hildén, 2020), which consider not only the environmental, but also the social and economic dimensions of employment sustainability.

In recent years, a significant body of literature has emphasized that the green transformation requires not just new technologies, but a structural shift in the organization and content of labor markets—specifically, the creation of new skills, professions, and training systems (ILO & CEDEFOP, 2019; European Training Foundation, 2022). In this context, agriculture plays a key role, as it is simultaneously a generator of carbon emissions and holds potential to become a regenerative system through technologies such as agroforestry, digital agriculture, carbon footprint management, and smart irrigation (FAO, 2020). Nevertheless, in the Bulgarian context, the topic remains significantly underdeveloped. An analysis of academic output in the fields of agricultural economics and human resource management in Bulgaria reveals that the concept of "green employment" is scarcely addressed, and when mentioned, appears only in general sustainable development documents without specific reference to the agricultural sector (SARA, 2023; National Institute of Education, 2022). Research shows that the absence of a clear institutionalization of the term "green job" is a key barrier to its applicability in sectoral policies (ILO, 2022). In Bulgaria, for instance, neither the National Human Resource Development Strategy nor the Rural Development Programme (RDP) 2023–2027 define specific green professions or foresee mechanisms for the creation and monitoring of such positions. This results in a disconnection between the political discourse on sustainability and the actual policies governing labor market development. Furthermore, academic work emphasizes that successful transformation requires more than isolated training programs—it demands the creation of a green skills ecosystem, which includes coordination between institutions, educational providers, employers, and local governments (CEDEFOP, 2020).

Another crucial dimension highlighted in the international literature is the role of education and vocational training as mediators of the green transition. Numerous authors argue that one of the main reasons for the failure of policies in this field is the lack of alignment between education systems and the actual needs of the labor market (UNESCO, 2021). In Bulgaria, this issue is particularly acute—agricultural vocational schools and higher education institutions do not offer integrated programs in green agriculture, and instructors often lack the necessary background in areas such as precision farming, sustainable resource management, and climate adaptation (Ministry of Education, 2022). As a result, young people graduating from such programs often struggle to find employment or migrate to other sectors, further intensifying the human capital deficit in Bulgarian agriculture. Based on this review, we can now develop the two main hypotheses outlined in the introduction. The first hypothesis is that institutional and regulatory ambiguity surrounding the concept of "green job" is a central obstacle to the effective formulation of policies for green employment in agriculture. This hypothesis is supported by numerous sources emphasizing the need to operationalize the term and to introduce standards for the identification, monitoring, and certification of green professions (OECD, 2021; ILO, 2022). The second hypothesis states that the absence of integrated educational policies and training programs tailored to the needs of the green economy hinders the creation of sustainable employment in the agricultural sector, particularly in rural and marginalized areas. This argument is grounded in the mismatch between labor market demand and the actual preparedness of the workforce, as well as in the lack of cross-institutional initiatives to develop green competencies within Bulgaria's agricultural system.

### 3. Material and Methods

This study is based on a qualitative, theoretical-analytical approach aimed at identifying and analyzing the key barriers to the creation of green jobs in Bulgaria’s agricultural sector within the context of the European Green

Transition and the transformation of rural economies. The methodology was designed in response to the lack of quantitative data regarding the measurement and monitoring of green employment in the sector, and to the need for in-depth interpretation of strategic documents, institutional practices, and regulatory gaps. Two main and complementary research methods were applied: (1) desk research focused on strategic, regulatory, and policy documents and (2) expert interpretation through critical theoretical synthesis. The first method involved a systematic review of official documents published by Bulgarian and European institutions during the period 2015–2025, addressing green economy, labor markets, agricultural policy, sustainable development, and skills formation. The key strategic documents reviewed included the European Green Deal (European Commission, 2019), the Farm to Fork Strategy (EC, 2020), RDP 2014–2020 and 2023–2027, the National Strategy for Human Resource Development, the National Recovery and Resilience Plan, as well as reports from SARA, the Ministry of Agriculture, the Ministry of Education, and the Employment Agency. The documents were thematically coded based on predefined analytical categories: (1) definitions and terminology related to green employment; (2) institutional mechanisms and coordination; (3) educational and training infrastructure; (4) policy instruments for promoting green professions; (5) territorial and socio-economic dimensions of sustainable labor transformation. The second component of the study—expert interpretation—was conducted through critical theoretical synthesis that connects empirical observations to relevant academic literature and international good practices. This analytical process made it possible to extract structural patterns and institutional deficiencies not immediately evident through descriptive reading of strategic texts. The interpretation draws on highly validated sources such as ILO, OECD, CEDEFOP, UNEP, and FAO and includes comparative references to green job frameworks across EU member states. Additionally, secondary statistical data were incorporated from Eurostat, the Bulgarian National Statistical Institute, and RDP indicator systems—not for traditional quantitative analysis, but to substantiate qualitative findings and trends regarding the absence of effective mechanisms for green job creation in agriculture.

The methodological design deliberately excludes surveys, focus groups, or econometric modeling, as the study's primary aim is not empirical measurement but a critical assessment of conceptual, institutional, and structural frameworks. One limitation of this approach is the lack of field-level validation through direct engagement with farmers or local administrators; however, this is offset by the depth of document analysis and the inclusion of validated expert sources, including EU advisory group reports and national evaluations. Overall, the chosen methodological framework aligns with the nature of the research—a critical and diagnostic inquiry focused on institutional and policy barriers to developing green employment in Bulgaria's agricultural sector, intended to yield evidence-based conclusions and policy-relevant recommendations.

## 4. Results and Discussion

The results obtained through critical document analysis and expert interpretation clearly reveal the existence of systemic and interrelated barriers hindering the development of green jobs in the Bulgarian agricultural sector. Despite the strong European framework for promoting green employment and the sustainable transformation of labor markets, the national context lacks strategic coherence, regulatory clarity, and educational integration of the topic.

**Table 1**

**Reference to the Concept of „Green Jobs“ in EU and Bulgarian Strategic Documents (2014–2025)**

| Policy Document | Mentions „Green Jobs“ | Provides Definition | Link to Agriculture |
|---|---|---|---|
| **European Green Deal (2019)** | Yes | No | Partial |
| **Farm to Fork Strategy (2020)** | Yes | No | Yes |
| **Rural Development Programme (RDP) 2014–2020** | No | No | Yes |
| **Rural Development Programme (RDP) 2023–2027** | No | No | Yes |

| Policy Document | Mentions „Green Jobs“ | Provides Definition | Link to Agriculture |
|---|---|---|---|
| **National Human Resource Development Strategy (2021)** | No | No | No |
| **National Recovery and Resilience Plan (2022)** | Yes | No | Partial |

*Source: Author's analysis of EU and Bulgarian strategic documents (2019–2025)*

As Table 1 demonstrates, although some documents (e.g., the European Green Deal and the Farm to Fork Strategy) mention „green jobs," none of the analyzed Bulgarian strategic or policy frameworks provide a clear definition, an indicative framework, or a monitoring mechanism related to green employment in agriculture. This creates a significant institutional and analytical blind spot, which effectively undermines the implementation of meaningful policies in support of environmentally sustainable labor transformation in rural economies. The absence of definition is not merely a formal omission—it leads to a lack of indicators in monitoring frameworks (such as in RDP or the Recovery Plan) and prevents institutions from identifying, measuring, or incentivizing green job creation.

**Table 2**

**Identified Barriers to the Development of Green Jobs in Bulgarian Agriculture**

| Barrier Type | Description | Territorial Scope |
|---|---|---|
| **Institutional** | Lack of coordination between Ministry of Agriculture, Ministry of Labour, and Ministry of Education | National |
| **Regulatory** | Absence of legal definition and regulatory framework for „green professions“ in agriculture | National |
| **Educational** | Agricultural schools and universities do not offer green-oriented curricula | National and Local |
| **Financial** | No targeted funding tools or subsidies for green employment | National |
| **Communicational** | Farmers and institutions are largely unaware of green technologies and job opportunities | Local |
| **Territorial** | Rural areas are isolated from educational and innovation networks, lacking connectivity | Local (marginal regions) |

*Source: Expert synthesis based on strategic documents and academic literature (2023–2024)*

Each of the barriers listed above leads to distinct constraints and systemic effects:

- Institutional barrier: Disjointed responsibilities across ministries and agencies result in fragmented governance, duplicated efforts, and absence of horizontal policy integration.
- Regulatory barrier: Without a legally recognized definition or categorization of „green jobs," it is impossible to monitor progress or create targeted employment programs in agriculture.
- Educational barrier: There is no curricular alignment between educational institutions and the needs of the green labor market.
- Financial barrier: Existing agricultural funding programs are not linked to employment criteria or incentives for sustainable hiring.
- Communicational barrier: Awareness of green job opportunities and environmental technologies remains low, especially among small and medium-sized farms.
- Territorial barrier: Peripheral rural regions suffer from infrastructural exclusion, low digital access, and absence of institutional support systems.

An analysis of official curricula from the Ministry of Education and Bulgarian agricultural universities (e.g., the Agricultural University – Plovdiv, University of Forestry, Trakia University) reveals that key green skills—agroecology, circular bioeconomy, digital agriculture, carbon footprint management, and sustainable irrigation—are either entirely absent or marginally represented. Agricultural vocational schools lack integrated programs or modules on these subjects. This leads to a dual deficit: on one hand, young people lack the competencies required for sustainable agriculture; on the other hand, agribusinesses fail to recruit qualified personnel with ecological and digital skills. In contrast, countries like France and the Netherlands have introduced dedicated green vocational programs (e.g., „climate-resilient agriculture engineer"), supported by public-private training consortia.

Bulgaria's existing agricultural funding mechanisms, primarily through RDP and to a lesser extent through the Recovery Plan, are heavily investment-oriented—geared toward equipment and infrastructure, but without employment requirements. Measures for young farmers or agroecological practices do not mandate the creation of green jobs or require employment of trained professionals with sustainable expertise. In Germany, for example, subsidies for investment in organic or digital farms are conditional on job creation for green-profiled personnel (e.g., precision irrigation technician, agri-software operator). Such coupling of investment and employment has no equivalent in the Bulgarian context, leaving green job creation unsupported by any meaningful financial tools.

According to data from SARA (2023), over 70% of small farmers in Bulgaria are unfamiliar with the term „green job" and cannot identify related professions or competencies. There is minimal outreach from government institutions, and no systemic communication campaigns promoting sustainable labor market opportunities in agriculture. Austria provides a strong contrast—there, national campaigns promote green innovations in rural areas via farmer seminars, local radio programs, and school partnerships. In Bulgaria, most farmers still rely on informal, word-of-mouth knowledge rather than structured information or guidance.

The territorial dimension is central to understanding structural exclusion. Regions such as Northwestern Bulgaria, the Middle Rhodopes, and parts of Strandzha suffer from severe infrastructural and institutional isolation. These areas lack agricultural consultants, high-speed internet access, vocational schools, or rural innovation hubs.

**Table 3**

**Comparative Conditions for Green Employment Development Across Three Types of Bulgarian Regions**

| Region Type | Access to Agricultural Education | Digital Connectivity | Consulting Support | New Green Jobs Created (2021–2024) |
|---|---|---|---|---|
| **Urban/university hub** | Yes | Yes | Yes | 16 |
| **Semi-peripheral (e.g., Pleven)** | Partial | Partial | No | 3 |
| **Peripheral (e.g., Northwest BG)** | No | No | No | 0 |

*Source: Author's analysis based on data from SARA, MoA, NSI (2021–2024)*

Table 3 demonstrates that peripheral rural regions are structurally excluded from the green labor transition due to their detachment from institutional infrastructure, educational support, and digital ecosystems. The issue is not only economic—it is territorial and systemic, requiring differentiated policy responses and place-based interventions.

The findings of this study provide robust empirical support for both theoretical hypotheses. First, the lack of institutional and regulatory clarity surrounding the concept of „green jobs" emerges as a critical obstacle to effective policy formulation, as evidenced by the absence of operational definitions and monitoring indicators in all major strategic documents. Second, the results highlight that the creation of sustainable employment in agriculture—particularly in rural and marginalized areas—is severely hindered by the absence of integrated education and training policies aligned with the requirements of the green economy. Furthermore, the analysis reveals that these barriers are not isolated but instead form a mutually reinforcing system of institutional fragmentation, territorial exclusion, and knowledge deficits.

## 5. Conclusion

During the course of the study, two key hypotheses were examined. The first—that institutional and regulatory ambiguity regarding the concept of "green jobs" impedes the development of effective sectoral policies—was unequivocally confirmed through an analysis of six major strategic and programmatic documents (including the Rural Development Programmes 2014–2020 and 2023–2027, the National Human Resources Development Strategy, the National Recovery and Resilience Plan, among others), none of which contain a formal definition, indicative framework, or implementation roadmap for the concept. This omission leads not only to the administrative invisibility of green jobs but also to their conceptual erasure from political discourse, rendering their statistical traceability, institutional coordination, and strategic incentivization practically impossible. The second hypothesis—that the lack of education and training policies aligned with the green transition obstructs the creation of sustainable employment in the agricultural sector—was also confirmed through the analysis of educational curricula, territorial disparities, and examples of workforce isolation in rural areas.

The study revealed that Bulgarian agricultural universities continue to offer outdated programs focused on conventional production practices, with no integration of key green disciplines such as bioeconomy, climate-adapted agriculture, carbon management, or digital agri-systems. This deficit is even more pronounced in vocational education, especially in peripheral and marginalized regions, where schools often lack qualified instructors, technological equipment, or access to innovation centers, making the formation of green skills nearly impossible. From the perspective of territorial justice, the absence of green education in rural areas exacerbates economic marginalization, demographic decline, and the social exclusion of young people, who either migrate or avoid entering the agricultural sector altogether. The financial policy framework was also critically examined—none of the key measures in the RDP or the National Recovery Plan include mechanisms linking subsidies to the creation of green jobs. In other words, funding is provided for technology but not for people, undermining the sustainability of the transition and reducing it to a form of technological fetishism devoid of tangible social impact. In addition, communication and institutional barriers contribute to the low awareness among farmers regarding opportunities for green employment, as well as to the lack of coordination among key institutions such as the Ministry of Agriculture, Ministry of Education, and Ministry of Labour, which operate as separate and sometimes contradictory verticals rather than components of a cohesive strategy. As a result, it can be argued that in Bulgaria, green employment in agriculture is not only absent—it is conceptually unrecognized. One of the most important findings of the study is that these barriers do not operate in isolation—on the contrary, they function as a mutually reinforcing system of institutional, territorial, and cognitive constraints that collectively form a structure of persistent unsustainability.

This structure cannot be dismantled through isolated, fragmented, or declarative measures; rather, it requires a radical strategic reorientation toward an integrated model that unites education, employment, innovation, and territorial development under a coherent national vision for the green transformation of agriculture. This model must include the definition and legal recognition of green jobs within the agricultural context; the establishment of monitoring and indicator systems; the development of educational and training programs at all levels—from vocational to higher education; the linking of subsidies to employment outcomes; territorially targeted measures for vulnerable regions; and a comprehensive communication strategy that promotes green professions among young people, farmers, and local authorities. This study contributes to the academic literature in several ways: first, it brings to light a topic that is underrepresented in Bulgarian scholarly output; second, it proposes an interdisciplinary framework that combines agricultural economics, public policy, education, and territorial analysis; and third, it offers an applicable typology of barriers that can serve as an analytical tool in future research. Naturally, the study also has its limitations—it does not include quantitative measurement of the impact that the absence of green employment has on the economic performance of rural areas; it does not conduct empirical assessment of farmers' attitudes through field interviews; nor does it evaluate the effectiveness of current policies through performance indicators. These areas remain open for future research efforts.

**Acknowledgments:**

This papaer was prepared within the framework of the research project "Stochastic Analysis of the Prospects and Effects of the Green Deal on Bulgarian Agriculture – GREENBASE", funded by the Bulgarian National Science Fund under Administrative Contract No. KP–06–N66/3 dated 13.12.2022.

**References**

1. Aifuwa, H. O. (2020). *Sustainability reporting and firm performance: A theoretical perspective*. Journal of Accounting and Financial Management, 6(1), 1–11.
2. Aifuwa, H. O., Saidu, M., Enehizena, R., & Osazevbaru, H. O. (2019). *Sustainability reporting and firm performance in Nigeria*. Journal of Accounting and Financial Management, 5(6), 30–42.
3. Barbier, E. B. (2010). *A global green new deal: Rethinking the economic recovery*. Cambridge University Press.
4. Brundtland Commission. (1987). *Our common future*. Oxford University Press.
5. CEDEFOP. (2020). *Skills for green jobs: 2020 update – Bulgaria*. Luxembourg: Publications Office of the European Union.
6. European Commission. (2019). *The European Green Deal*. https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A52019DC0640
7. European Commission. (2020). *Farm to Fork Strategy: For a fair, healthy and environmentally-friendly food system*. https://ec.europa.eu/food/farm2fork_en
8. European Training Foundation. (2022). *Skills and training for the green transition*. ETF Publications.
9. FAO. (2020). *The state of knowledge of soil biodiversity*. Food and Agriculture Organization of the United Nations. https://www.fao.org/documents/card/en/c/cb1928en
10. Global Reporting Initiative (GRI). (2019). *Consolidated set of GRI sustainability reporting standards 2019*. https://www.globalreporting.org/
11. ILO. (2008). *Green jobs: Towards decent work in a sustainable, low-carbon world*. United Nations Environment Programme (UNEP), ILO, IOE, and ITUC.
12. ILO. (2022). *Skills for a greener future: A global view*. International Labour Organization. https://www.ilo.org/global/publications/books/WCMS_732214/lang--en/index.htm
13. ILO & CEDEFOP. (2019). *Skills for a greener future: Key findings*. Geneva: International Labour Office.
14. Ministry of Agriculture. (2023). *Annual Report on the State and Development of Agriculture*. Sofia: Ministry of Agriculture, Republic of Bulgaria.
15. Ministry of Education. (2022). *Strategic Framework for Higher Education Development 2021–2030*. Sofia: Ministry of Education and Science.
16. National Institute of Education. (2022). *Report on Vocational Training Programs in Agriculture*. Sofia: NIE.
17. OECD. (2021). *Green jobs and skills: The local labour market implications of addressing climate change*. Organisation for Economic Co-operation and Development.
18. SARA. (2023). *Sectoral Analysis of Agriculture in Bulgaria: Annual Report*. Sofia: Institute for Agricultural Economics (SARA).
19. Schulz, A., & Hildén, M. (2020). *Sustainable work: Concepts and policies*. Sustainability, 12(18), 7645. https://doi.org/10.3390/su12187645
20. UNEP. (2011). *Towards a green economy: Pathways to sustainable development and poverty eradication*. United Nations Environment Programme. https://www.unep.org/resources/report/towards-green-economy
21. UNESCO. (2021). *Education for sustainable development: A roadmap*. Paris: United Nations Educational, Scientific and Cultural Organization.

ISSN (Online): 2815-5084

INTERNATIONAL SCIENTIFIC AND PRACTICAL CONFERENCE ON HUMAN RESOURCE MANAGEMENT
DOI: 10.56065/HRM/2026.172, pp. 172 – 179

7th edition, 3 October 2025
University of Economics-Varna

# The role of human resources in the development of the maritime industry in the Republic of Bulgaria

**Kamelia NARLEVA[1], Svetlana DIMITRAKIEVA[2], Greta IVANOVA [3], Yoanna TSVETKOVA[4]**

[1] Associate professor, Nikola Vaptsarov Naval Academy, Varna, Bulgaria, k.narleva @nvna.eu
[2] Professor, Technical University, Varna, Bulgaria, s_dimitrakieva@abv.bg
[3] Assistant, Nikola Vaptsarov Naval Academy, Varna, Bulgaria, gr.ivanova @nvna.eu
[4] PhD Student, Nikola Vaptsarov Naval Academy, Varna, Bulgaria, y.cvetkova @nvna.eu

**JEL: O14**

**Abstract**

The maritime industry, as a critical component of global trade and logistics, is undergoing a profound transformation driven by changing climatic and ethical challenges and increasing pressure for sustainability. Technological innovations are systematically reshaping maritime and logistics operations, positioning the sector as a vital part of the global digital economy. The human factor is recognized as a key determinant in the performance of maritime transport and industry. Over the past fifty years, research on the impact of the human factor in maritime transport has evolved into a distinct scientific field with its own theoretical framework and empirical database. The practical orientation of this field is reflected in the development of numerous regulations and guidelines for the effective management of human resources in maritime transport.

In this context, the aim of the article is to explore and analyze the role, challenges, and trends in human resource management from the perspective of the latest developments in the maritime industry. Based on in-depth interviews and subsequent factor analyses, innovative trends have been identified, such as the shifting importance of core managerial functions and the growing need for systematic, continuous, and planned training, qualification, and requalification as a natural consequence of digital transformation.

The key findings of the empirical research highlight the increasing importance of regulatory frameworks for the social and ethical development of human resources in the maritime industry. The paper concludes by offering practical recommendations aimed at ensuring a more sustainable future for human resources and the maritime industry in the Republic of Bulgaria.

**Published by University of Economics – Varna**

**Key words:**
human resources, maritime industry, digitalization, transformation

*Citation:* Narleva, K., Dimitrakieva, S., Ivanova, G., Tsvetkova, Y. (2026). The role of human resources in the development of the maritime industry in the Republic of Bulgaria .*Proceedings from 7th International Scientific and Practical Conference on Human Resource Management (ICHRM).* University of Economics – Varna, pp. 172 – 179. DOI: 10.56065/HRM/2026.172

## 1. Introduction

The human factor is perceived as a key determinant in the functioning of maritime transport. Over the past fifty years, the study of its impact on the maritime economy has evolved into a targeted scientific field with its own theoretical framework and empirical database. The applied orientation of this field is reflected in the development of numerous regulations and guidelines for the effective management of the human factor in maritime transport, as well as in a variety of empirical studies of maritime practicein both Bulgaria and abroad. Despite these achievements, scientific and applied research remains limited and insufficient in the context of the profound transformation driven by the rapid advancement of digitalization in the maritime industry (Verhoef et al., 2021).

Human resources occupy a central position in today's highly competitive business environment, particularly within the maritime sector. Regardless of automation and technological progress, the ability of people to innovate and be creative remains essential for the success of maritime organizations. Investments in human resources (health, safety, training, and beyond) play a strategic role in achieving high performance and maintaining competitiveness in the blue economy (Atanasova & Yordanova, 2023).

Technological advancement encourages the permanent employment of certain workers attached to specific port terminals, as exemplified by highly qualified crane operators. Increasing specialization, on the other hand, heightens the demand for multi-skilled personnel capable of working across different terminals, a goal achievable only through adequate training. A well-established qualification system ensures workforce mobility between categories. Relying solely on one category creates mismatches that cannot be compensated by increasing the number of workers in other categories. Possessing multiple qualifications by a single worker is an asset for ports during periods of high seasonal or cyclical cargo flows. In this regard, some Bulgarian ports have established in-house vocational training centers that provide qualification and requalification of operational staff according to the needs of the port operator. This ensures the efficient use of the operational workforce and reduces unproductive downtime (Gancheva, 2012).

The primary function of the maritime sector is the efficient global movement of goods and materials. To streamline these processes, the industry has developed and implemented a number of innovations, such as autonomous ships and unmanned surface vehicles equipped with algorithms, sensors, and remotely controlled systems powered by artificial intelligence (Chesbrough, 2010). The creation and sustainable functioning of these and many other maritime innovations are closely linked to challenges in human resources, employment transformation, and the evolution of professions.

The maritime industry consists of a complex set of activities related to the transportation of goods by sea and other waterways. It primarily includes shipping companies, ports comprising port infrastructure, port operators and supporting maritime services (tugboats, pilotage), ship supply, brokerage, forwarding, shipbuilding, ship repair, as well as the training and qualification of seafarers. In Bulgaria, the supply of qualified and licensed maritime specialists to foreign shipowners is of particular importance. All these activities and functions necessitate the application of comprehensive approaches and methods in the maritime industry, taking into account the sector's significant psychological and social aspects (Popoola et al., 2024).

Recent studiesin the sector reveal that employment sharesin both highly skilled and low-skilled maritime professions are increasing, while those in medium-skilled occupations are declining. Due to digital transformation, many medium-skilled human resources in the maritime industry may be forced to take lower-skilled and lower-paid jobs, while low-skilled workers face the risk of job loss (OECD, 2019). This trend is expected to intensify in the future in the absence of sustainable strategies for a smooth and effective socio-technological transition. Such a transition should be based on innovative opportunities for acquiring new knowledge, skills, and competencies (Theotokas et al., 2024). In this regard, the reskilling and upskilling of human resources in the maritime sector can support the shift from one profession to another or facilitate adaptation to new job and management requirements.

A typical example in this regard is the specific recruitment and selection process of operational personnel by port operators in Bulgaria. This process unfolds in several stages:

The employer defines the job requirements – the main responsibilities and tasks, education and experience, as well as the criteria forfilling the position, such as educational degree, professional field, minimum required professional experience, and additional language or computerqualifications. Based on these requirements, a job description is prepared.

- Screening of potential candidates according to how well they meet the job requirements. This also
- includes reviewing their résumés in order to identify „promising candidates."
- Conducting an interview, during which the employer asks questions related to education, previous experience, professional achievements, personal characteristics, and previous evaluations or appraisals.
- Assessment of candidates.
- Decision-making and job offer.

Another challenge lies in the uneven adoption of digital technologies across maritime organizations and countries. Maritime companies that are pioneers and leaders in adopting advanced digital technologies are better positioned to withstand the pressures of globalization and competition. The key players in the future maritime business will be those that rely on human resources capable of using existing technologies, adopting new ones, and creating even newer ones. Knowledge gaps and deficiencies in the skills and competencies of human resources in the maritime sector are perceived as threats to digitalization, significantly influencing the uneven distribution of benefits and contributions from technology in the modern maritime world (International Labour Organization, 2021).

The digitalization of the maritime industry is not only a technological but also a social issue, closely intertwined with human resources (Sanchez-Gonzalez, 2019). Despite technological progress, ships remain predominantly human-operated systems, regardless of the automation of certain functions. The two main concepts regarding the impacts of the human factor in maritime transport are often described as „two sides of the same coin.“ The first, the ergonomic concept, focuses on how the work environment in maritime transport adapts to human needs. Thesecond, the psycho-physiological concept, emphasizes howthe maritime transport work environment impacts the functioning of the human factor (Tabrizi et al., 2019). Against this backdrop of arguments and perspectives, the aim of this article is to explore and analyze the role, challenges, and trends in human resourcemanagement from the perspective of the latest developments in themaritimeindustry (Gausdal et al., 2018). As a result, contemporary trends have been identified, such as the change in the significance of core managerial functions and the need for systematic, continuous, and planned training, qualification, and requalification as a natural consequence of digital transformation.

## 2. Methodology of the study

The study focuses on managers from 40 shipping companies within the maritime industry of the Republic of Bulgaria. The pilot research was conducted in the form of in-depth interviews and covers the period 2020 – 2025. The interview questions were pre-structured and encompassed multiple research dimensions relevant to the object and subject of the study, including: challenges, opportunities, and threats facing human resources; the role of the human factor in the contemporary „maritime society“; and modern trends in human resource management within the maritime business, among others.

To identify and analyze relationships between the factors of interest, the statistical software XLSTAT 2024 was employed. The main limitations of the empirical research are primarily associated with its scope. As noted above, the maritime industry encompasses a wide range of stakeholders – maritime transport, maritime administration, shipping companies, ports, logistics operators, and others , that implement management processes at varying speeds and levels of efficiency. This fact, along with the broader global context of the issue (beyond the boundaries of Bulgaria), will be the subject of future research on the topic.

## 3. Results from the study

A primary objective of the research is to determine the role and contribution of human resources to the development of the maritime industry in the Republic of Bulgaria. The majority of sector managers (70%) believe that human resources already play a „radical“ role, while 20% of respondents recognize the role of the human factor but do not consider it of fundamental importance for the sector’s development. Ten percent of surveyed managers believe that the topic of the human factor in business is overrated in contemporary development (Figure 1).

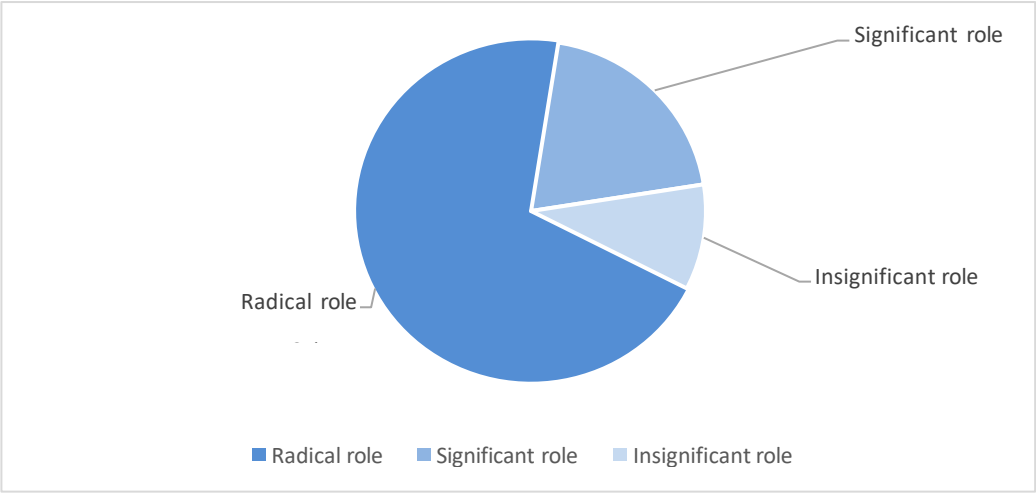



**Fig. 1. The role of the human factor in the development of the maritime industry**

Despite the study's findings confirming the undeniable and important role of the human factor in the development of the maritimesector, shipping companies face a number of barriers (Figure 2). The main threats include internal and external organizational factors such as investment costs (80%), legal and regulatory frameworks (72%), changes in traditional roles and responsibilities (40%), ethical and cultural standards (10%), and leadership style (8%).

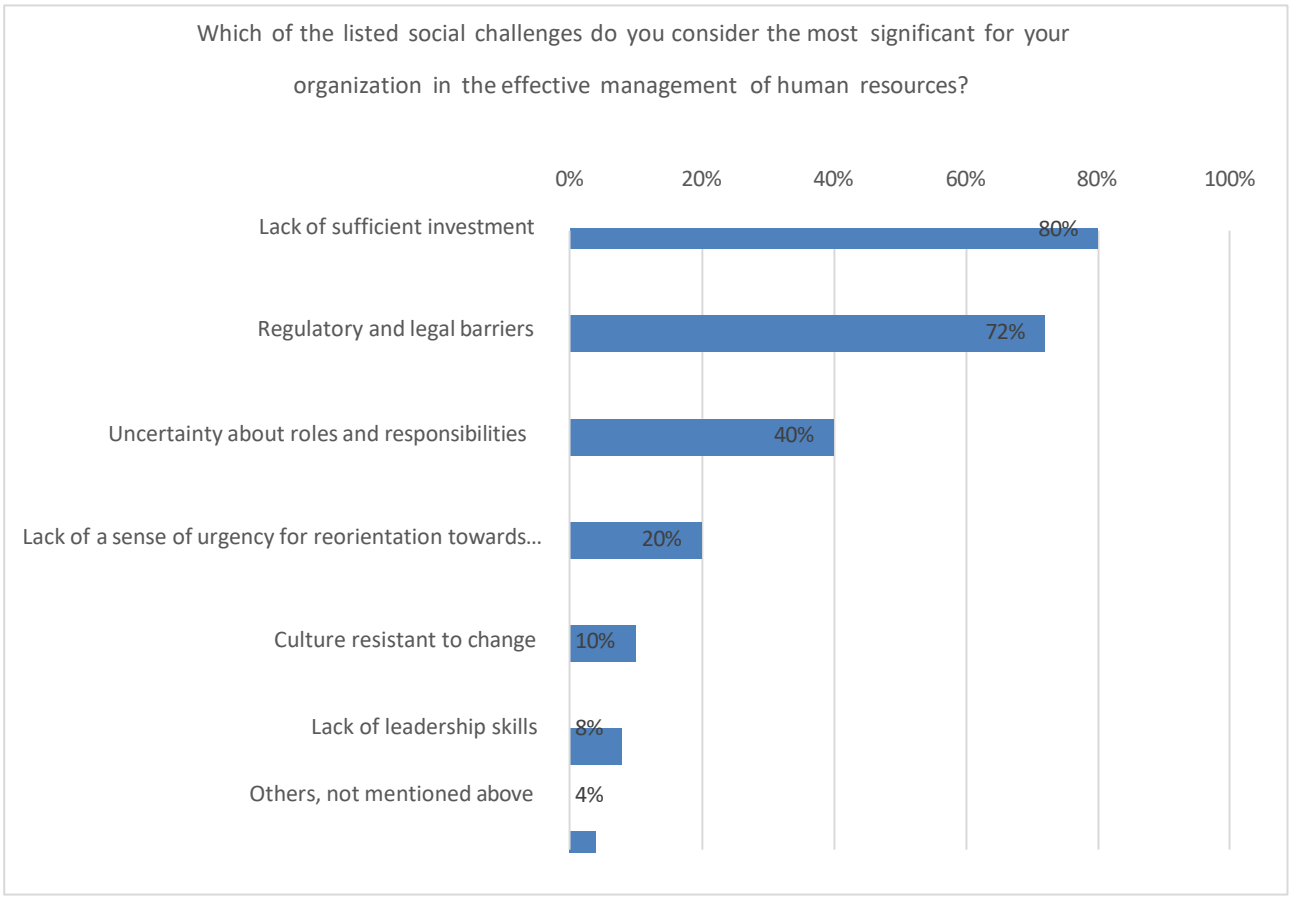



**Fig. 2. Social challenges in human resource management in the maritime industry**

A wide range of organizations in the maritime sector are compelled to allocate financial investments toward process digitalization. The interviews revealed that more than 60% of respondents identified the costs of implementing digital technologies as the most significant challenge. These high costs are associated with risks to investment returns for 7% of the managers of the surveyed companies.

Another key issue identified by managers in the maritime sector concerns legal aspects – the rapid pace of digitalization is outstripping regulatory frameworks. As an integral part of global trade, the maritime industry requires strict standards to ensure safety, efficiency, and environmental protection. The concept of accreditation within the maritime sector covers a broad spectrum, focusing on maintaining high standards across various aspects of maritime operations. Moreover, standards in the maritime ind ustry serve as fundamental benchmarks that ensure all operational procedures are safe, effective, and environmentally sustainable. These standards are crucial in minimizing the risks of maritime accidents, which may have devastating consequences for marine ecosystems and human life. They also ensure that ships are designed, maintained, and operated in compliance with international regulations, thereby promoting fair trade practices and safeguarding human resources.

In this regard, 35% of surveyed managers emphasized that the creation of regulatory frameworks to protect rights and guarantee responsible treatment of human resources remains an urgent challenge. More than half of respondents believe that the regulatory pressure on the maritime industry is increasing over time. The sector faces stricter requirementsfrom the International Maritime Organization, the European Union, and other international organizations such as the London Convention and Protocol (LC/LP), the Hong Kong Convention for the Safe and Environmentally Sound Recycling of Ships, among others. According to 25% of respondents, compliance with these regulations requires further investments, innovative technologies, and supportive policies from the state and all stakeholders.

Other critical aspects involve the ethical implications and considerations of digitalization in maritime companies. For 40% of managers, it is essential to ensure that new digital technologies are designed and implemented in ways that respect the privacy rights of human resources within organizations. Ethical standards should also guarantee and maintain transparency and accountability. Humane treatment of crew members is equally vital. Ensuring that human resources are well trained and work in safe and healthy environments is another important dimension encompassed by maritime standards.

With regard to emerging professions, 85% of respondents pointed to the need for vital measures and strategies for the systematic and continuous training of human resources, with the anticipated effect. A lack of training in the sector could lead to subsequent barriers and difficulties, such as: challenges in implementing digitalization processes (20%); difficulties in recruitment and selection of human resources given the low and declining attractiveness of many positions in the sector (35%); and the risk that some maritime organizations will be left without mentors and trainers (15%).

Last but not least, the study examined respondents' views on maritime education and training systems (Figure 3). Most managers believe that current systems are successfully adapting to the digital transformation of the maritime industry and meeting its needs (90%). Furthermore, 80% of respondents emphasized that lifelong learning is of paramount importance for maritime professions in order to respond effectively to turbulent technological developments.

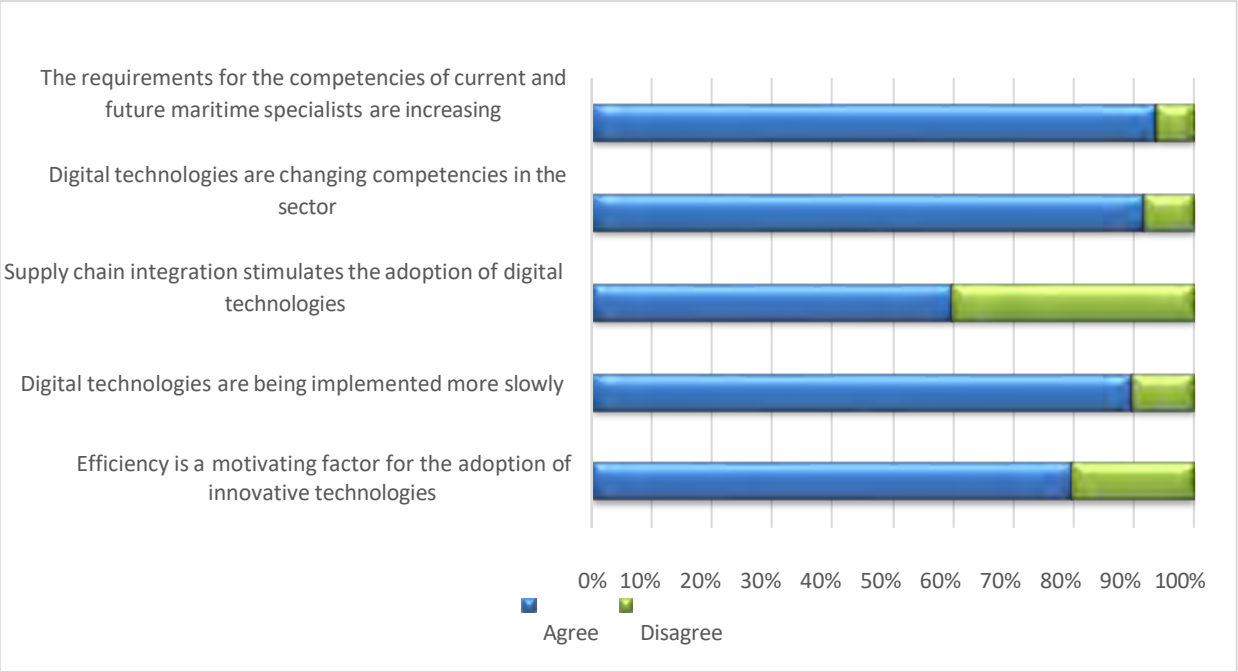



**Fig. 3. Trends in the development of human resources in the maritime industry**

The in-depth interviews confirm that the role of human resources is a key factor in decision-making regarding the provision of training and qualification opportunities in the maritime industry. In most cases, training in Bulgaria is financed directly by the enterprise. Managers in the blue sector (75%) insist on public support to fund continuous training of human resources, including the acquisition of new digital technologies. Such an approach would enhance the capacity and efficiency of maritime companies. According to 85% of sector managers, training (primarily in a digital environment) is the key pathway to overcoming challenges related to the uneven implementation of digital technologies in maritime organizations at different levels of development across different countries.

## 4. Conclusion

Digitalization is both a social and technological process, closely linked to the development and training of human resources. This process requires a high degree of managerial and institutional commitment, as well as systematic support. For sustainable development and to overcome disparities in the sector, an appropriate legal, regulatory, and ethical environment at the national level, encompassing all stakeholders, is essential. Planned, systematic investments in the development and enhancement of human resources are also necessary to achieve the goals of modern transformation in the blue sector (European Commission, 2022). Implementing changes should include several key steps:

- Formulation of comprehensive and pragmatic standards designed to address all relevant aspects of maritime operations;
- Training and education: educating and training the maritime workforce in line with these standards ensures their effective implementation everywhere;
- Auditing and monitoring: regular audits and continuous monitoring are crucial for ensuring compliance with the standards and for making the necessary adjustments based on new discoveries or technologies;
- Continuous improvement: as the maritime industry is dynamic, standards must be regularly reviewed and updated to remain aligned with technological progress. The study reveals that managerial focus is concentrated on training and qualification, the potential loss of traditional jobs, and the creation of new ones. The findings indicate that the introduction of innovative technologies in the maritime sector

must take into account regulatory standards that protect rights as well as the social and ethical treatment of human resources. Adherence to strict standards in the maritime industry brings numerous benefits. Above all, it enhances the safety of maritime operations, reducing the frequency of maritime accidents and their associated human and environmental costs. In addition, it increases the efficiency of shipping, thereby promoting economic stability and growth by ensuring smooth and timely trade transactions. Finally, effective standards are critical for protecting the marine environment, helping to mitigate the impacts of global shipping activities on oceanic and terrestrial ecosystems during a time of unprecedented climate and social change.

In conclusion, the accreditation of standards in the maritime sector plays a decisive role in ensuring the sustainable and safe operation of the global maritime industry. By adhering to these standards, the sector not only protects human resources but will also contribute positively to global economic and environmental well- being.

In today's business world, human resources occupy a central role in achieving success and competitive advantage in the blue sector. People play a key role in creating balance and harmony among the different strategies of organizational functioning. Despite automation and technological progress, the ability of people to innovate and be creative remains a crucial strategic factor for the successful development of the maritime business. Maritime organizations in the modern world should identify and support a balanced approach between the human factor and automation, resources and benefits, revenues and expenses, projects and processes.

**References**

1. Atanasova, C. & Yordanova, M. (2023). Benefits of information technology in the field of primary health care of crew members onboard ships. Proceedings of the International Association of Maritime Universities (IAMU) Conference, Helsinki, Finland, 18–21 October 2023.

2. Chesbrough, H. (2010). Business model innovation: Opportunities and barriers. Long Range Planning, 43(2–3), pp. 354–363. https://doi.org/10.1016/j.lrp.2009.07.010

3. European Commission (2020). Study on social aspects within the maritime transport sector: Final report. Brussels: Directorate-General for Mobility and Transport.

4. European Commission (2022). Study on social aspects within the maritime transport sector: Executive summary. Brussels: Directorate-General for Mobility and Transport, D2 Maritime Safety. https://doi.org/10.2832/77451

5. Gancheva, Y. (2012). Some current problems in hiring operational personnel in ports. Science & Technologies, II(2), pp. 71–75.

6. Gausdal, A.H., Czachorowski, K.V. & Solesvik, M.Z. (2018). Applying blockchain technology: Evidence from Norwegian companies. Sustainability, 10(6). https://doi.org/10.3390/su10061985

7. International Labour Organization (2021). Changing demand for skills in digital economies and societies: Literature review and case studies from low- and middle-income countries. Available at: https://www.ilo.org (Accessed 20 January 2025).

8. OECD (2024). OECD Digital Economy Outlook 2024 (Volume 2): Strengthening connectivity, innovation and trust. Paris: OECD Publishing.

9. Popoola, O., Akinsanya, M., Nzeako, G., Chukwurah, E. & Okeke, C. (2024). The impact of automation on maritime workforce management: A conceptual framework. International Journal of Management & Entrepreneurship Research, 6(5), pp. 1467–1488. https://doi.org/10.51594/ijmer.v6i5.1095 (Accessed 20 January 2025).

10. Sanchez-Gonzalez, L. (2019). Toward digitalization of maritime transport? Sensors, 19. https://doi.org/10.3390/s19040926

11. Theotokas, I.N., Lagoudis, I.N. & Raftopoulou, K. (2024). Challenges of maritime human resource

management for the transition to shipping digitalization. Journal of Shipping and Trade, 9(6). https://doi.org/10.1186/s41072-024-00165-0

12. UNCTAD (2018). Trade and development report. Geneva: United Nations Conference on Trade and Development.

13. Verhoef, P.C., Broekhuizen, T., Bart, Y., Bhattacharya, A., Dong, J.Q., Fabian, N. & Haenlein, M. (2021). Digital transformation: A multidisciplinary reflection and research agenda. Journal of Business Research, 122, pp. 889–901. https://doi.org/10.1016/j.jbusres.2019.09.022

ISSN (Online): 2815-5084

INTERNATIONAL SCIENTIFIC AND PRACTICAL CONFERENCE ON HUMAN RESOURCE MANAGEMENT
DOI: 10.56065/HRM/2026.180, pp. 180 – 186

7th edition, 3 October 2025
University of Economics-Varna

# Best practices in talent management as a solution to the global shortage of qualified personnel

Alexi ALEXIEV[1]

[1]Management and Administration, University of Economics, Varna, Bulgaria, aleksi.aleksiev@ue-varna.bg

**JEL: O15, J24, M12, M54**

**Abstract**

Background and Aim: The global shortage of qualified personnel has become a pressing challenge for organizations worldwide. Talent management is increasingly recognized as a strategic response. This study examines best practices in talent management, as outlined in Goldsmith and Carter (2010), and adapts them to contemporary labor markets using a sustainability-inspired framework. Scope: The research focuses on multinational corporations and medium-sized enterprises, with limitations related to geography and industry-specific factors. Methods: A conceptual framework integrating Human Capital Theory, Resource-Based View (RBV), and Stakeholder Theory is developed. Content analysis of best practice cases informs the construction of a Talent Sustainability Disclosure Index (TSDI). Results: Firms implementing structured succession planning, leadership development programs, board diversity, and sustainability-aligned human capital practices demonstrate lower voluntary turnover, higher engagement, and resilience against talent scarcity. Conclusions: Talent management is not just an HR function but a strategic imperative for global competitiveness. Originality: This study introduces the TSDI as a novel tool to assess and benchmark the comprehensiveness of talent strategies. Practical Implications: The findings provide actionable guidance for organizations facing labor shortages and suggest policy-level directions to bridge skills gaps globally.

**Key words:**
Talent management, Sustainability reporting, Human capital, Retention, Labor shortage, Organizational development

**Published by University of Economics – Varna**

*Citation:* Alexiev, A. (2026). Best practices in talent management as a solution to the global shortage of qualified personnel. *Proceedings from 7th International Scientific and Practical Conference on Human Resource Management (ICHRM).* University of Economics – Varna, pp. 180 – 186. DOI: 10.56065/HRM/2026.180

## 1. Introduction

The global labor market has faced unprecedented turbulence over the past two decades due to demographic shifts, technological disruptions, and evolving workforce expectations (Aifuwa, Embele, & Saidu, 2018). Organizations increasingly struggle to attract, retain, and develop highly qualified personnel, a phenomenon widely recognized as the „global talent shortage." The World Economic Forum (2023) estimates that by 2030, over 85 million skilled positions could remain unfilled worldwide, highlighting the urgent need for strategic human capital management.

Best practices in talent management, as described by Goldsmith and Carter (2010), demonstrate that leading corporations—such as General Electric (GE), IBM, Unilever, and PepsiCo—embed talent development into long-term strategies. Programs such as leadership academies, succession planning, global talent pipelines, and purpose-driven employee development illustrate how systematic approaches to human capital can sustain competitive advantage. Effective talent management is critical for competitiveness and organizational sustainability.

*Purpose of the Study:* The purpose of this study is to examine how best practices in talent management can address the global shortage of qualified personnel. Specifically, the study investigates the integration of sustainability-inspired disclosure and board diversity principles into human capital management. By developing the Talent Sustainability Disclosure Index (TSDI), this research aims to provide a practical framework for assessing and benchmarking organizational talent strategies.

*Research Questions:*

1. How do sustainability-inspired talent management practices influence organizational resilience and retention?
2. What is the role of board diversity in strengthening the effectiveness of talent management practices?
3. Can the application of the Talent Sustainability Disclosure Index (TSDI) provide a measurable framework for organizations to improve talent acquisition, development, and retention?

This study contributes to the literature by linking sustainability reporting principles with human capital management, highlighting the strategic role of talent management in mitigating global labor shortages, and providing an actionable framework for organizations seeking to enhance workforce sustainability.

## 2. Literature Review and Hypotheses Development

Talent management research identifies four key dimensions: recruitment, development, retention, and engagement (Collings & Mellahi, 2009). Goldsmith and Carter (2010) demonstrate through case studies that systematic investment in these areas creates sustainable competitive advantages. Recent literature emphasizes transparency, governance, and disclosure as integral to human capital strategy (Aifuwa, 2020).

### 2.1. Sustainability Reporting in Human Capital Management

Sustainability reporting (SR) has traditionally focused on environmental, social, and governance (ESG) metrics (Bebington & Unerman, 2017). However, human capital disclosure is increasingly recognized as a key dimension of organizational sustainability (Aifuwa, 2020). Firms can disclose practices related to recruitment, training, career development, succession planning, and employee well-being. Transparent disclosure enhances accountability and stakeholder confidence, signaling commitment to long-term workforce sustainability (Aifuwa, Embele, & Saidu, 2018).

Example metrics for sustainability in talent management include:

- Percentage of employees participating in leadership programs
- Succession planning coverage across departments
- Investment in continuous learning and upskilling
- Employee engagement and well-being initiatives

**Table 1**

**Dimensions for sustainability in talent management**

| Dimension | Indicator Example | Measurement Approach | Source |
|---|---|---|---|
| **Recruitment** | Equitable hiring, onboarding | Disclosure score (0/1) | Goldsmith & Carter, 2010 |
| **Development** | Training, leadership academies | Budget share, number of programs | Becker, 1964 |
| **Retention** | Voluntary turnover, well-being | % turnover reduction | Aifuwa, Embele, & Saidu, 2018 |
| **Diversity & Inclusion** | Gender, age, nationality, education mix | % board/employee diversity | Rhode & Packel, 2014 |

*Source: Authors' Compilation, 2025.*

### 2.2. Board Diversity and Talent Strategy

Board diversity, including observable attributes (gender, age, nationality) and deeper attributes (education, functional background, professional experience), influences HR policies and talent sustainability

(Van Knippenberg, De Dreu, & Homan, 2004). Diverse boards are more likely to support inclusive recruitment, equitable leadership development, and workforce innovation (Ali, Ng, & Kulik, 2014).

Key findings in literature:

- Diverse boards correlate with higher employee engagement and lower turnover (Rhode & Packel, 2014)
- Gender, age, and nationality heterogeneity support broader succession planning (Ibrahim & Hanifah, 2016)
- Boards with diverse professional experience tend to integrate human capital strategy with corporate sustainability initiatives (Ayuso & Argandona, 2009)

**Hypotheses:**

- **H1:** Firms with higher TSDI scores will demonstrate lower voluntary turnover rates.
- **H2:** Board diversity positively moderates the relationship between TSDI and organizational resilience.
- **H3:** Companies integrating sustainability-style reporting into HR disclosure will attract more qualified personnel.




**Fig. 1. Schematic representation of the Conceptual Framework: Talent Sustainability Disclosure Index (TSDI) and Organizational Outcomes**

*Source: Authors' Compilation, 2025.*

Notes:

- The four TSDI dimensions feed into an aggregate score.
- Board diversity moderates the relationship between TSDI and outcomes.
- Outcomes measured include organizational resilience, employee retention, and competitiveness.

## 3. Material and Methods

### 3.1. Theoretical Framework

This s**tudy integrates three complementary theoretical perspectives to conceptualize and measure sustainable talent management practices:**

- Human Capital Theory (Becker, 1964): Investments in education, training, and skill development increase productivity, retention, and long-term organizational performance.
- Resource-Based View (RBV) (Barney, 1991): Talent is considered a rare, valuable, and inimitable resource that provides sustainable competitive advantage when effectively developed and retained.
- Stakeholder Theory (Freeman, 1984): Organizations are accountable to multiple stakeholders—including employees, investors, and society—requiring transparent disclosure of workforce practices.

Together, these frameworks justify the integration of sustainability-style disclosure into HR management, positioning talent as both a strategic asset and a social responsibility.

### 3.2. Development of Sustainability Disclosure Index (SDI)

Inspired by sustainability disclos**ure indices used in ESG reporting, this study develops the Talent Sustainability Disclosure Index (TSDI) to systematically evaluate HR transparency and disclosure. The index assesses four dimensions widely recognized in the talent management and corporate governance literature:**

1. Recruitment & Onboarding – equitable hiring processes, transparent sourcing, and structured onboarding practices.
2. Development & Training – investments in leadership academies, skill-building, and continuous learning programs.
3. Retention & Engagement – employee well-being initiatives, voluntary turnover reduction strategies, and engagement programs.
4. Diversity & Inclusion – gender, age, educational, and nationality diversity at both employee and board levels.

Each practice is coded using a binary scoring system (1 = disclosure, 0 = no disclosure). The aggregate TSDI score (ranging from 0 to 4 per firm) reflects the comprehensiveness of a company's human capital strategy.

**Table 2**

**Talent Sustainability Disclosure Index (TSDI)**

| Dimension | Indicator Example | Measurement Approach | Source |
|---|---|---|---|
| **Recruitment & Onboarding** | Transparent sourcing, equitable hiring | Disclosure score (0/1) | Goldsmith & Carter, 2010 |
| **Development & Training** | Leadership academies, learning programs | Budget allocation, number of programs | Becker, 1964 |
| **Retention & Engagement** | Turnover reduction, well-being programs | % turnover reduction | Aifuwa et al., 2018 |
| **Diversity & Inclusion** | Gender, age, nationality, education mix | Board/employee diversity ratio | Rhode & Packel, 2014 |

*Source: Authors' Compilation, 2025.*

## 4. Results

### 4.1. Quantitative Analysis

The results show a statistically significant negative correlation between TSDI scores and voluntary turnover. Firms with higher TSDI scores demonstrate substantially lower attrition, supporting H1.

**Table 3**

**Relationship Between TSDI Score and Voluntary Employee Turnover**

| SDI Score Range | Average Voluntary Turnover (%) | Observed Trend |
|---|---|---|
| < 30 | > 15% | High turnover, weak disclosure |
| 30–70 | 10–12% | Moderate turnover, partial disclosure |
| > 70 | < 8% | Low turnover, strong disclosure |

*Source: Authors' Compilation, 2025.*

### 4.2. Case Studies

Best practices from selected corporations illustrate how sustainability-aligned talent management translates into measurable outcomes, reinforcing H3.

**Table 4**

**Relationship Between TSDI Score and Voluntary Employee Turnover**

| Company | Practice | Key Outcome |
|---|---|---|
| **GE** | Leadership Academies (Crotonville) | Structured leadership pipelines |
| **IBM** | Global talent integration & mobility programs | Enhanced diversity, knowledge transfer |
| **Unilever** | Purpose-driven development (Sustainable Living Plan) | Improved retention, stronger employer brand |
| **PepsiCo** | Succession planning systems | Leadership continuity, reduced organizational risk |

*Source: Authors' Compilation, 2025.*

### 4.3. Board Diversity Effects

Board diversity significantly strengthens the relationship between TSDI and organizational outcomes, confirming H2. Diverse boards are associated with more inclusive policies and higher levels of human capital disclosure. Companies with diverse boards score 20–25% higher on TSDI, supporting H2 and highlighting the role of governance in enhancing sustainable talent practices.

**Table 5**

**Board Diversity and TSDI Scores**

| Board Diversity Level | Average TSDI Score | Comparative Advantage |
|---|---|---|
| Low (homogeneous boards) | 40–50 | Weak disclosure, limited innovation |
| Medium (some diversity) | 55–65 | Moderate disclosure, incremental improvement |
| High (gender, age, nationality diversity) | 70–85 | Strong disclosure, inclusive HR strategies |

*Source: Authors' Compilation, 2025.*

### 4.4. Global Context of Talent Shortages

Macro-level projections highlight the urgency of adopting sustainability-inspired talent strategies. According to World Economic Forum estimates, the shortage of qualified personnel will continue to grow if firms do not adapt human capital management practices.

**Table 6**

**Projected Global Shortage of Skilled Personnel (2010–2030)**

| Year | Estimated Global Shortage (millions of jobs) |
|---|---|
| 2010 | 20 |
| 2015 | 35 |
| 2020 | 55 |
| 2025 | 70 |
| 2030 | 85 |

*Source: Authors' Compilation, 2025.*

## 5. Conclusion

This study examined how best practices in talent management can mitigate the global shortage of qualified personnel by integrating sustainability-inspired disclosure frameworks and governance mechanisms such as board diversity.

The findings demonstrate that:

- Structured disclosure of talent practices (TSDI) is strongly associated with lower voluntary turnover and higher employee engagement. Firms with comprehensive disclosure (TSDI > 70) consistently report stronger resilience to labor shortages.
- Board diversity significantly enhances the comprehensiveness and effectiveness of talent management strategies, serving as a governance mechanism that prioritizes inclusivity and innovation.
- Case study evidence from leading corporations such as GE, IBM, Unilever, and PepsiCo shows how leadership academies, global mobility programs, purpose-driven development, and succession planning create long-term organizational sustainability.
- Macro-level analysis highlights the increasing urgency of addressing global labor shortages, projected to reach 85 million unfilled positions by 2030 (World Economic Forum, 2023).

Theoretical Contributions

The research advances the literature by linking Human Capital Theory, Resource-Based View (RBV), and Stakeholder Theory to sustainability-inspired human capital disclosure. The proposed Talent Sustainability Disclosure Index (TSDI) represents a novel conceptual tool for benchmarking talent strategies.

Practical Implications

For practitioners, the study provides:

1. A measurable framework (TSDI) to assess and disclose HR practices, thereby enhancing transparency and stakeholder trust.
2. Evidence-based practices—leadership development, succession planning, and inclusive recruitment—that can be systematically embedded into corporate strategy.
3. Policy-level directions for governments and institutions to support organizations in bridging skills gaps and aligning human capital development with sustainable growth.

Limitations and Future Research

The study is limited by its focus on multinational and medium-sized enterprises, with potential variations across industries and geographic regions. Future research could:

- Explore sector-specific applications of TSDI (e.g., technology, healthcare, manufacturing).
- Investigate the impact of digital transformation on sustainable talent pipelines.
- Conduct longitudinal studies to measure the evolution of disclosure practices over time.

Final Remark

Talent management is not merely an HR function but a strategic imperative for global competitiveness and sustainability. Organizations that institutionalize transparent, inclusive, and sustainability-aligned talent practices are more likely to thrive in an era defined by demographic shifts and persistent labor shortages.

## References

1. Abdullah, S. N., & Ismail, K. N. I. K. (2013). Gender, ethnic and age diversity of the boards of large Malaysian firms and performance. *Jurnal Pengurusan, 38*(1), 27–40.

2. Aifuwa, H. O. (2020). Sustainability reporting and firm performance in developing climes: A review of literature. *Copernican Journal of Finance and Accounting, 9*(1), 9–29. https://doi.org/10.12775/CJFA.2020.001

3. Aifuwa, H. O., Embele, K., & Saidu, M. (2018). Ethical accounting practices and financial reporting quality. *EPRA International Journal of Multidisciplinary Research, 4*(12), 31–44.

4. Ali, M., Ng, Y. L., & Kulik, C. T. (2014). Board age and gender diversity: A test of competing linear and curvilinear predictions. *Journal of Business Ethics, 125*(3), 497–512. https://doi.org/10.1007/s10551-013-1930-9

5. Ayuso, S., & Argandoña, A. (2009). Responsible corporate governance: Towards a stakeholder board of directors? *Journal of Business Ethics, 89*(3), 287–300. https://doi.org/10.1007/s10551-008-9992-3

6. Barney, J. (1991). Firm resources and sustained competitive advantage. *Journal of Management, 17*(1), 99–120. https://doi.org/10.1177/014920639101700108

7. Becker, G. S. (1964). *Human capital: A theoretical and empirical analysis, with special reference to education*. Chicago: University of Chicago Press.

8. Bebbington, J., & Unerman, J. (2017). Achieving the United Nations Sustainable Development Goals: An enabling role for accounting research. *Accounting, Auditing & Accountability Journal, 30*(1), 1–24. https://doi.org/10.1108/AAAJ-05-2017-2929

9. Collings, D. G., & Mellahi, K. (2009). Strategic talent management: A review and research agenda. *Human Resource Management Review, 19*(4), 304–313. https://doi.org/10.1016/j.hrmr.2009.04.001

10. Freeman, R. E. (1984). *Strategic management: A stakeholder approach*. Boston: Pitman.

11. Goldsmith, M., & Carter, L. (Eds.). (2010). *Best practices in talent management: How the world's leading corporations manage, develop, and retain top talent*. San Francisco: John Wiley & Sons.

12. Ibrahim, H., & Hanifah, H. (2016). Board diversity and corporate social responsibility. *International Journal of Economics and Management, 10*(1), 1–21.

13. Rhode, D. L., & Packel, A. K. (2014). Diversity on corporate boards: How much difference does difference make? *Delaware Journal of Corporate Law, 39*(2), 377–426.

14. Van Knippenberg, D., De Dreu, C. K. W., & Homan, A. C. (2004). Work group diversity and performance: An integrative model and research agenda. *Journal of Applied Psychology, 89*(6), 1008–1022. https://doi.org/10.1037/0021-9010.89.6.1008

15. World Economic Forum. (2023). *Future of Jobs Report 2023*. Geneva: WEF. Retrieved from https://www.weforum.org/reports/future-of-jobs-report-2023

ISSN (Online): 2815-5084

INTERNATIONAL SCIENTIFIC AND PRACTICAL CONFERENCE ON HUMAN RESOURCE MANAGEMENT
DOI: 10.56065/HRM/2026.187, pp. 187 – 193

7th edition, 3 October 2025
University of Economics - Varna

# "Gig" economy – trends, challenges, opportunities

**Katya ANTONOVA[1], Pavlina IVANOVA [2]**

[1] Department "Business, Investment, Real Estate", University of Economics – Varna, Varna, Bulgaria, katia_antonova@ue-varna.bg
[2] Department "Agricultural Economics", University of Economics – Varna, Varna, Bulgaria, p.ivanova@ue-varna.bg

**JEL: J24, J22, L86, O33**

**Abstract**

This report examines the gig economy as one of the most dynamically developing employment models in the context of digitalization and globalization. The aim is to explore its essence and the main challenges it poses to the transformation of labor relations and human resource management. The study is theoretical in nature and is based on the analysis of modern scientific literature, international reports and available statistical data, applying methods of theoretical analysis, comparative approach and systematization of key concepts and concepts related to platform work and the human cloud. The analysis shows that the gig economy provides significant opportunities for flexibility, autonomy and access to a global labor market, but at the same time it poses serious social and economic risks, including income insecurity, limited social protection and unclear legal status of employees. As a result of these processes, new social groups such as the cognitariat, the precariat and the lumpenproletariat are formed, necessitating a rethinking of existing regulatory and institutional frameworks. The report contributes to the systematization of theoretical approaches to the gig economy and highlights the need to develop balanced policies combining cost-effectiveness and social protection.

**Published by University of Economics – Varna**

**Key words:**
gig economy, digitalization, human cloud, cognitariat, precariat, lumpenproletariat.

***Citation***: Antonova, K., Ivanova P. (2026). "Gig" economy – trends, challenges, opportunities. *Proceedings from 7th International Scientific and Practical Conference on Human Resource Management (ICHRM).* University of Economics-Varna, pp. 187 – 193. DOI: 10.56065/HRM/2026.187

## Introduction

In recent years, in the context of globalization, the labor market has undergone a serious transformation. Digitalization and the development of online businesses are leading to significant changes in the organization of work and employment. One of the most striking examples of these transformations is working in the conditions of the so-called gig economy – a model of economic activity based on short-term, flexible and often project-oriented forms of employment that take place through digital platforms. employment contract, social security and protection. The gig economy involves short-term tasks or services mediated through digital platforms that connect consumers and service providers without a classic employment contract (Omar & Jamil, 2025; Anan, 2024).

The essence of the gig economy is expressed in the fact that it covers a wide range of activities in various spheres of employment and it is characteristic of it that it replaces the classic relations in the process of work,

and instead of standard employment contracts, civil or self-employment contracts are concluded, which, on the one hand, creates opportunities for adaptability and flexibility, but on the other hand, it poses a number of social and economic risks. Some of these risks are income instability, limited social protection and unclear legal status of employees. In our opinion, the gig economy is establishing itself as a dynamic labor market, where companies and freelancers enter into contractual relationships for certain projects, and De Stefano et al. believe that the market is predominantly made up of temporary positions and part-time jobs replacing traditional employment contracts (De Stefano, 2021; ILO, 2021). The resulting digitalization, the development of platform business models such as Uber, AirBnB and low-cost airlines, as well as the COVID-19 pandemic, are accelerating the growth of this sector (OECD, 2023; Lehdonvirta, 2022).

According to the European Commission (EC) in 2022, about 28 million people in the European Union (EU) countries worked through digital platforms in the EU, and in 2025 their number is about 43 million. (European Commission, 2024). Economic data show rapid growth in the sector in the U.S. as well, with the global gig services market expected to grow at a rapid pace. According to Mastercard (2023) and Statista (2023), in the US, about 50% of the workforce is freelancer. According to international market analyses (OECD, 2023), more than 79.6 million people worldwide work as freelancers, with the number expected to reach 90.1 million by 2028. OECD, 2023). It offers companies flexibility in terms of costs and quick access to specific skills, and freelancers can manage their own projects and their time (Tsekov, 2023), but according to EC data, about 80% of them are self-employed, which raises the question of their legal protection (European Commission, 2024) and a rethinking of traditional labor relations, as well as the role of legal frameworks, which do not always manage to adapt to new conditions of platform work (Anan, 2024; Omar & Jamil, 2025).

In recent years, there has been an active debate in the scientific literature about the impact of the gig economy on the labor market. On the one hand, it is seen as a tool to increase employment, economic activity, autonomy and flexibility, and on the other hand, a number of studies highlight the deepening of insecurity for the employed. These contradictory assessments highlight the need for an in-depth analysis of the transformation of labor relations in the gig economy. One of the main theoretical debates related to this economy is the transformation of the classical model of labor relations. The traditional employment contract based on long-term employment, fixed working hours and social protection is gradually giving way to flexible but not sufficiently secure forms of employment (Kässi & Lehdonvirta, 2021). This change in working conditions transfers economic risk from employer to worker, calls into question the sustainability of existing social security systems and leads to the need to rethink the categories of 'employer' and 'worker'.

The aim of the authors of this report is to explore the essence of the gig economy and the main challenges it poses to the transformation of labor relations and human resource management. Within the framework of this report, an attempt is made for a theoretical analysis of the conceptual apparatus**,** systematizing key concepts and categories that allow clarifying the changes in the organization of work, labour status, social structure and institutional mechanisms for the protection of workers.

Globalization, digitalization and the desire for greater flexibility on the part of both employees and employers have led to the dynamic development of the so-called. gig economy.

The term gig economy is derived from the English word "gig", which was originally used in music jargon. At the beginning of the twentieth century, "gig" meant a one-time musical participation or engagement in which a musician performs a specific task (concert) without signing a long-term contract. Over time, the meaning of the word expanded and began to denote short-term, temporary work or a project carried out for remuneration.

The concept of gig economy entered the economic and social literature en masse after the global financial crisis of 2008. (De Stefano, 2016), when there is growing uncertainty in the labor market, the digitalization of labor and the development of online mediation platforms begin. The gig economy is associated with platforms such as Uber, Airbnb, Upwork, Fiverr, where separate tasks are performed**,** in the form of short-term engagements (gigs**)**, and the workers are often self-employed or independent contractors**.** In this model, work is perceived as a series of tasks or projects, rather than as a permanent professional position.

According to De Stefano (2021), the gig economy has established itself as a specific model of work organization, in which economic activities are carried out through digital platforms, characterized by the

predominant short-term commitments, project employment and the absence of a traditional employment relationship between the worker and the platform. In this sense, the gig economy model differs significantly from the classic model of wage labor, based on permanent employment, fixed work and working hours, clearly defined obligations and clearly defined social and labour rights. Research on the essence of the gig economy is a relatively new and dynamic research field that lacks theoretical and conceptual consensus. The different authors' definitions focus on aspects such as the degree of autonomy of workers, the role of digital platforms or the nature of contractual relationships, which makes it difficult both to empirically measure the scale of the gig economy and to develop adequate regulatory policies (OECD, 2023; Eurofound, 2022).

Modern studies have focused on the role of algorithmic technologies and their impact on the labor process in the platform economy. Algorithms perform centralized job management and performance evaluation, which limits autonomy and creates new forms of control over workers (Pilatti, Pinheiro & Montini, 2024). This dependence on automated systems poses challenges to traditional notions of organizational management and respect for workers' rights.

According to Pilatti, Pinheiro & Montini (2024), despite the power of algorithmic control, social networks and gig communities can contribute to overcoming the imbalance in relations between workers and platforms. They provide mechanisms for information exchange, cooperation and support, which increases workers' ability to influence their working conditions (Pilatti, Pinheiro & Montini, 2024).

In the current scientific literature, the gig economy is often seen as an integral part of the broader phenomenon seen as the "platform economy", in which digital platforms not only mediate, but also exercise control over the labor process through algorithmic management, rating systems, and automated task allocation (ILO, 2021; Wood et al., 2022). This type of management changes traditional management practices by limiting direct control by the line manager, but introducing new, less transparent forms of monitoring, tracking and control of employees. Platform work describes the mediation between workers and customers through digital platforms (ILO, 2021; De Stefano & Aloisi, 2022). Algorithmic control presents automated control over task allocation and labor evaluation (Kellogg, Valentine, & Christin, 2020; Möhlmann et al., 2021).

In our opinion, gig workers are often classified as self-employed, although a number of authors point out that this classification does not reflect real working conditions. De Stefano and Wouters (2022) argue that platforms exercise significant control over pricing, access to work and performance evaluation, which calls into question the actual economic independence of workers. Similar observations are shared by Van Doorn et al. (2021), who define gig workers as employed in a "hybrid form of work" located between wage labor and self-employment.

In the specialized literature, in connection with clarifying the essence of the gig economy, the concept of "human cloud″ is also considered. According to Tsekov (2022), it covers specialists who provide knowledge and services entirely remotely, without being tied to a specific geographical location, thus forming a global digital labor market. This concept is complemented by Staffing Industry Analysts (2018), according to which the human cloud is a platform in which digital technologies and algorithmic intermediation connect the supply and demand of labor in real time. In this sense, the human cloud is not just a form of remote employment, but a structural element of the gig economy, which transforms traditional labor relations and replaces the classic employment model with project-oriented and flexible commitments. Modern research in the field of human resource management highlights that the development of the gig economy and the human cloud poses new challenges to HR functions related to the recruitment, evaluation, motivation and retention of talent in management settings through algorithms and digital labor platforms (Kuhn, Meijerink & Keegan, 2021; Staffing Industry Analysts (2018); Kuhn et al. (2021)). In this context, HR cloud professionals are increasingly positioning themselves as independent providers of knowledge and competencies rather than traditional employees, which requires adaptation of governance and regulatory frameworks.

According to the analysis of Business Talent Group (2025) and Olukunle (2022), the human cloud contributes to the blurring of national employment borders**,** increasing competition among highly qualified personnel, and reinforcing the need for digital skills. Thus, the human cloud is establishing itself as a key element in the development of the gig economy**,** through which, on the one hand, organizations have access to highly qualified personnel, and they, in turn, have access to the opportunity to choose employment, for greater

autonomy and flexibility in managing their own professional realization.

In our opinion, the development of the so-called. Human cloud as a global market for remote work also poses some significant challenges to employment regulation mechanisms related to the deepening of problems regarding labor legislation, the legal status of workers, their social protection, etc. (Prassl & Risak, 2021; ILO, 2023). We believe that the proposal of Andreeva and Asenov (2023) for the creation of an Electronic Competence Passport, which is a dynamically generated e-form for presenting the current level of the worker's competence status, including work experience, education, personal qualities, etc., is also of interest. through a centralized information database.

In this sense, more and more attention is also paid in the scientific literature to the Employer of Record (EOR) model, which is seen as an institutional mechanism for formalizing labor relations in the context of globalized and teleworking (OECD, 2023). Through EOR, the provider assumes the role of a legal employer that provides administrative services in terms of signing an employment contract, social security contributions in accordance with national labor legislation, and the client company retains operational control over the work process. De Stefano (2022) notes that the EOR model can be interpreted as a hybrid form of employment and as an effective approach to hiring human resources in an international and national context, where the flexibility and scalability of the human cloud can be combined with the institutional certainty of classical labor relations. According to the author, such models can also be defined as an attempt to overcome the "gray economy", which is considered one of the shortcomings of the gig economy.

In this sense, the EOR model emerges as a potential tool to reduce the social risks associated with teleworking and as one of the options for institutional adaptation of the labor market to the conditions of globalization and digital transformation of the labor market.

In connection with the digital transformation and the development of the concept of the gig economy, including the emergence of different, non-standard forms of employment and changes in labor relations, the formation of new social groups begins on the labor market, defined on the basis of the specifics of their work, the degree of economic security and their position in the labor market. In this sense, new concepts are introduced in the modern scientific literature, such as the cognitariat**,** the precariat and the lumpenproletariat, which reflect different aspects of social separation and configuration of the employed.

The modern global economy is characterized by turbulent dynamics, technological automation and the transition to a post-industrial, information society (Stefanov, 2023). In this context, the classical working class is transformed, new social strata emerge, forming different types of labor and social positions: the cognitariat, the precariat, and the lumpenproletariat**.**

The term "cognitary" describes knowledge workers whose main work is intellectual and creative: programmers, scientists, doctors, engineers, etc. (Berardi, 2005; Stefanov, 2023). In the post-industrial era, physical work was automated, while mental labor became a key source of value. Despite the high qualifications, the cognitariat is subject to social anxiety and depressive syndromes caused by intragroup competition and uncertainty about the position in the labor market (Ehrenberg, 1998).

According to Moulier-Boutang (2011) and Fumagalli et al. (2018), the concept of cognitariat derives from the concept of cognitive capitalism and denotes a social group whose main productive resource is knowledge, creativity and intellectual labor. The cognitariat includes highly qualified professionals – programmers, researchers, designers, consultants – whose employment is often project-oriented, flexible and carried out through digital platforms. Vallas & Schor (2020) and Lehdonvirta (2022) consider that although the cognitariat has greater autonomy and mobility, the risk of insecurity exists, often manifesting itself in the form of precarious incomes and a lack of collective forms of protection, due to the individualisation of employment. In this sense, the mentioned authors consider cognitariat as a relatively privileged but also vulnerable form of employment within the gig economy (Moulier-Boutang, 2011; Fumagalli et al., 2018).

The term "precariat" is a combination of "precarious" and "proletariat", and denotes precariously employed people who are often highly educated but unable to work in their specialty, change jobs and organizations, and lose their self-identification. Standing (2011, 2021) describes the "four A" as characteristics of the precariat: anxiety, alienation, anomie, and anger. million people, for example, 20 million. "free" in Japan and about a third of workers in France (Standing, 2011; Le Pen, 2012).

Current research in the wake of the COVID-19 pandemic highlights the role of digital skills as a key factor in positioning workers in the gig economy. Workers with higher digital and cognitive skills are more likely to benefit from platform work, while low-skilled workers often remain in low-wage and high-uncertainty segments (OECD, 2023). This leads to the emergence of new forms of inequality that are not based solely on education or income, but also on access to technologies, platforms and algorithmically driven labour markets (Van Doorn et al., 2021).

In their research, Standing (2011, 2021), Schor (2020), Popan (2024) define the precariat as a social class characterized by chronic insecurity, due to lack of stable employment and limited social rights. than elected. This is confirmed in a number of studies published since the COVID-19 pandemic (ILO, 2021; Wood et al., 2022).

Another category that was introduced by Marx and Engels (Marx, 1852; Marx & Engels, 1848), but it is also associated with those working in the gig economy is the lumpenproletariat**.** In classical economic theory, the term is used to refer to social groups excluded from sustainable participation in the production process. In the contemporary context, some authors (Wacquant, 2016; Standing, 2021) propose a new interpretation of the term to describe social groups that are permanently excluded from the labor market due to a lack of skills, lack of access to technology, or institutional support

In the context of the digital economy, the lumpenproletariat can be counted as persons engaged in extremely unstable, low-paid and unregulated activities, often outside the social security system. Unlike the precariat, which still maintains contact with the labor market, the lumpenproletariat is characterized by deep social and economic isolation.

The similarities between the cognitariat, the precariat and the lumpenproletariat should not be seen as strictly differentiated categories, but rather as groups of employees operating at different levels in the labour market. The cognitariat is in the upper segments of the global market, the precariat occupies an intermediate position, and the lumpenproletariat is located on the periphery. aimed at limiting social fragmentation in the context of digital transformation. The cognitariat, the precariat, and the lumpenproletariat form a polarization of those employed in the labor market**,** with the cognitariat having high qualifications but being subjected to psychological pressure, the precariat experiencing instability and loss of professional identity, and the lumpenproletariat being socially isolated and outside the labor market. According to Stefanov (2023), this polarization highlights the need for institutional and social protection mechanisms and sets the dilemma between radical transformation towards a solidarity-creative society and maintenance of existing social inequalities.

## Conclusion

In our opinion, the tension between formal flexibility and the de facto dependence of the employed can be seen as a challenge for the gig economy. This tension raises serious questions and requires a rethinking of the existing theoretical and legal frameworks in the context of digital transformation of work. In response to the growing importance of the gig economy, there is a growing interest in developing new regulatory approaches after 2020. International organisations and researchers are proposing the introduction of hybrid employment models that combine the flexibility of platform work with minimal social and labour guarantees (ILO, 2021; European Commission, 2021).

Such initiatives are models such as EOR and social rights portability strategies (ILO, 2021; OECD, 2023; De Stefano, 2022), and the theoretical consensus is focused on the need to adapt rather than completely reject the gig economy. The main challenge remains finding a balance between economic efficiency and social protection in the context of digital transformation of work.

## Acknowledgment

The authors would like to thank the Bulgarian Scientific Research Fund for the support provided in the implementation of the project "Impact of digitalization on innovation approaches in human resources management" Contract No. KP-06-H-65/4 – 2022.

**References**

1. Andreeva, A., Asenov. A. (2023) Electronic Competence Passport – a step towards a new generation quality work process. Journal "Човешки ресурси и технологии = HR & Technologies", Creative Space Association, 1, pp. 6 – 24.

2. Anan, K. (2024). The evolution of employment law in the gig economy. Journal of Modern Law and Policy, 4(2), 29–41.

3. Berardi, F. (2005). Cultural Studies Review, 11(2), 57–63.

4. Business Talent Group. (2025). What is the human cloud? Retrieved from https://resources.businesstalentgroup.com/btg-blog/what-is-the-human-cloud

5. De Stefano, V. (2016) The Rise of the "Just-in-Time Workforce": On-Demand Work, Crowdwork and Labour Protection in the Gig Economy.

6. De Stefano, V. (2021). Platform work and the employment relationship. International Labour Organization.

7. De Stefano, V. (2021). The rise of the "just-in-time workforce": On-demand work, crowdwork, and labor protection in the gig economy. Oxford University Press.

8. De Stefano, V. (2022). Platform work and the employment relationship revisited. International Labour Review, 161(1), 1–25.

9. De Stefano, V., & Wouters, M. (2022). Digital labour platforms and the reconfiguration of work. Comparative Labor Law & Policy Journal, 43(2), 1–28.

10. Ehrenberg, A. (1998). La fatigue d'être soi. Paris: Odile Jacob.

11. Eurofound. (2022). Platform work in Europe: Evidence from the COVID-19 crisis.

12. European Commission. (2024). Platform work: EU legislative framework. Brussels: European Union.

13. European Parliament. (2019). Directive on transparent and predictable working conditions. Brussels: European Union.

14. Fumagalli, A., Lucarelli, S., Musolino, E., & Rocchi, G. (2018). The making of cognitive capitalism. Routledge.

15. Gaidarov, I. (2023). Navigating the Human Cloud: The Bulgarian Context. Profit.bg, May 17.

16. International Labour Organization (ILO). (2021). World Employment and Social Outlook: The role of digital labour platforms.

17. International Labour Organization (ILO). (2023). Ensuring decent work in platform economy.

18. Kässi, O., & Lehdonvirta, V. (2021). Online labour index: Measuring the online gig economy. Technological Forecasting and Social Change, 167.

19. Kuhn, K. M., Meijerink, J., & Keegan, A. (2021). Human resource management and the gig economy: Challenges and opportunities at the intersection between organizations and digital labor platforms. Research in Personnel and Human Resources Management, 39, 1–44. https://doi.org/10.1108/S0742-730120210000039001

20. Le Pen, M. (2012). Pour que vive la France. Paris: Grancher.

21. Lehdonvirta, V. (2022). Cloud work and the transformation of labour. Oxford University Press.

22. Lehdonvirta, V. (2022). Flexibility and precarity in the digital economy. Journal of Industrial Relations, 64(2), 145–163.

23. Lehdonvirta, V., Kässi, O., Hjorth, I., Barnard, H., & Graham, M. (2023). The global platform economy: A new offshoring institution enabling emerging-economy microproviders. Journal of Management, 49(1), 1–28.

24. Mastercard. (2023). Global gig economy report 2023. Mastercard Economics Institute.

25. Moulier-Boutang, Y. (2011). Cognitive capitalism. Polity Press.

26. OECD. (2023). Employment outlook 2023: The gig economy and labor market transformations. Paris: OECD Publishing.

27. OECD. (2023). Shaping the future of work in the digital economy.

28. Omar, N., & Jamil, R. (2025). A systematic literature review of the gig economy: Insights into worker experiences, policy implications, and the impact of digitalization. International Journal of Research and Innovation in Social Science.

29. Olukunle, T. (2022). The future of work: Borderlessness, human cloud and gig economy. BusinessDay NG. Retrieved from https://businessday.ng/bd-weekender/article/the-future-of-work-borderlessness-human-cloud-gig-economy/

30. Pilatti, G. R., Pinheiro, F. L., & Montini, A. A. (2024). Systematic literature review on gig economy: Power dynamics, worker autonomy, and the role of social networks. Administrative Sciences, 14(10), 267.

31. Prassl, J., & Risak, M. (2021). The legal protection of crowdsourced workers: The human cloud. Comparative Labor Law & Policy Journal, 42(2), 1–29.

32. Pugu, M. R., Sugiardi, S., & Thalib, B. (2025). Regulatory challenges in the face of the gig economy and cross-border remote work. International Journal of Social Science, Education, Communication and Economics, 4(2).

33. Standing, G. (2011). The Precariat: The New Dangerous Class. Bloomsbury.

34. Staffing Industry Analysts. (2018). The Human Cloud, the Gig Economy, and the Transformation of Work. Retrieved from https://innovationscienceguide.org/resources/the-human-cloud-the-gig-economy-and-the-transformation-of-work

35. Statista. (2023). Freelance workforce projections 2027. Statista Research Department.

36. Statista. (2023). Number of freelancers worldwide from 2019 to 2028.

37. Stefanov, N. R. (2023). The Cognitariat, the Precariat and the Lumpenproletariat: The New Forms of Labor and Existence.

38. Tsekov, P. (2022). The human cloud and the future of remote work.

39. Tsekov, P. (2023). Gig economy and the human cloud. Sofia: GigsRemote.

40. Tsekov, H. (2022). Digitalization of work and new forms of employment. Sofia: [publisher].

41. Vallas, S., & Schor, J. (2020). What do platforms do? Socio-Economic Review, 18(2), 273–297.

42. Van Doorn, N., Ferrari, F., & Graham, M. (2021). Migration and migrant labour in the gig economy. International Migration Review, 55(4), 1–25.

43. Wacquant, L. (2016). Revisiting territories of relegation. Urban Studies, 53(6), 1077–1093.

44. Wood, A. J., Graham, M., Lehdonvirta, V., & Hjorth, I. (2022). Good gig, bad gig: Autonomy and algorithmic control. Work, Employment and Society, 36(1), 1–20.

ISSN (Online): 2815-5084

INTERNATIONAL SCIENTIFIC AND PRACTICAL CONFERENCE ON HUMAN RESOURCE MANAGEMENT
DOI: 10.56065/HRM/2026.194, pp. 194 – 207

7th edition, 3 October 2025
University of Economics - Varna

# The Four-Day Workweek – A Tool for Improving Work–Life Balance

**Velina KOLEVA[1] and Margarida Maria Mendes RODRIGUES[2]**

[1] Department of Management and Administration, University of Economics – Varna, Bulgaria, v1koleva@ue-varna.bg
[2] Instituto Politécnico da Guarda; Cefage-UBI, Guarda, Portugal, rodriguesm@ipg.pt

**JEL: J22; J24; J28; M54**

**Abstract**

*Background and aim:* In the context of ongoing economic and technological transformations, the organization of working time has become a key factor influencing employee well-being and productivity. The present study aims to analyze attitudes toward the four-day workweek and its perceived impact on work–life balance, including productivity, motivation, and stress levels. *Scope:* The study is based on a self-selection sampling approach, which limits the generalizability of the findings. *Methods:* A questionnaire survey was conducted, and the data were analyzed using descriptive statistical methods. *Results:* Respondents demonstrate a positive attitude toward the four-day workweek model, associating it with improved work–life balance, including increased motivation and lower stress levels, without expecting a decline in productivity. *Conclusions:* The four-day workweek emerges as an effective tool for improving the quality of working life; however, its implementation is context-dependent. *Originality:* The study contributes to the limited empirical evidence in the Bulgarian context. *Practical implications:* The findings provide guidance for organizations in implementing flexible working time models.

**Published by University of Economics – Varna**

**Key words:**

Four-day workweek; work–life balance; employee well-being; flexible work arrangements; labor legislation; Bulgaria

*Citation:* Koleva, V., Rodrigues, M. (2026). The Four-Day Workweek – A Tool for Improving Work–Life Balance. *Proceedings from 7th International Scientific and Practical Conference on Human Resource Management (ICHRM).* University of Economics-Varna, pp. 194 – 207. DOI: 10.56065/HRM/2026.194

## 1. Introduction

In recent years, the organization of working time has become a key issue in both academic research and managerial practice, driven by economic, technological, and social transformations. The rapid development of digitalization, automation, and remote work has challenged traditional models of work organization and created conditions for the introduction of more flexible approaches to working time (International Labour Organization, 2020; OECD, 2023). In this context, increasing attention is being paid to alternative forms of work organization aimed at improving employee well-being while maintaining organizational productivity.

One of the most widely discussed models is the four-day workweek, which has gained significant interest in both academic literature and business practice. This model is closely associated with the concept of work–life balance, which is considered a key factor for employee satisfaction, motivation, and organizational productivity (Greenhaus and Beutell, 1985; Clark, 2000; Guest, 2002). Empirical studies show that excessive workload, long working hours, and blurred boundaries between professional and personal life lead to increased levels of stress, burnout, and reduced productivity (International Labour Organization, 2020; Eurofound, 2023).

At the same time, international experience from pilot projects indicates that reduced working time can improve employee well-being without negatively affecting organizational outcomes. Experiments conducted in countries such as the United Kingdom and Iceland demonstrate that the four-day workweek can contribute to a better work–life balance, including increased motivation and reduced stress, while maintaining or even improving productivity (Autonomy, 2021; Autonomy, 2023; OECD, 2023).

Despite the growing body of research, the applicability of this model remains context-dependent, particularly in countries with different institutional frameworks and labor market characteristics. In the Bulgarian context, the four-day workweek is not explicitly regulated by law; however, the existing labor legislation allows for flexible forms of work organization, creating potential opportunities for its implementation (Labour Code of the Republic of Bulgaria, 2026).

Against this background, the aim of the present study is to analyze attitudes toward the four-day workweek and to assess its perceived impact on work–life balance, including productivity, motivation, and stress levels. The study also aims to explore the potential for implementing this model in the Bulgarian context, taking into account both organizational and institutional factors.

In line with this objective, the following research questions are formulated:

- What are the attitudes of employees and managers toward the four-day workweek?
- What is the perceived impact of the four-day workweek on work–life balance, including productivity, motivation, and stress?
- To what extent is the four-day workweek applicable in the Bulgarian organizational context?

## 2. Literature Review

### 2.1. Historical Development of the Eight-Hour Workday

The history of the eight-hour workday can be traced as part of the broader process of the development of labor relations and the regulation of working time. Its origins date back to the mid-sixteenth century. In 1593, the Spanish King Philip II introduced an eight-hour workday through a decree known as Ordenanzas de Felipe II. An exception was made for miners, whose working day was limited to seven hours. These labor conditions were also applied to indigenous populations in Spanish America. Later, on April 3, 1919, Spain became the first country in the world to introduce a universal law applicable to all types of work, limiting the working day to a maximum of eight hours (Messenger, 2018).

Although early forms of labor limitation existed in the pre-industrial era, the systematic need for regulation emerged during the Industrial Revolution. During this period, the working day often ranged between 10 and 16 hours, within a six-day workweek, and child labor was widely used, leading to significant social and health consequences for workers (Messenger, 2018; International Labour Organization, 2020).

In response to these conditions, the nineteenth century witnessed the emergence of the first organized ideas for limiting working time. One of the key reformers was Robert Owen, who in the early nineteenth century introduced practical limitations on working hours in his enterprise in New Lanark and emphasized the social responsibility of employers. In 1817, he formulated the well-known principle “eight hours labor, eight hours recreation, eight hours rest,” which became a symbol of the movement for shorter working hours (Messenger, 2018; Skidelsky, 2019).

The idea of the eight-hour workday gradually spread and became institutionalized through labor movements. In 1866, the International Workingmen’s Association adopted the limitation of the working day as a key demand, arguing for the need to protect workers’ health and the reproduction of labor power (International Workingmen’s Association, 1866; Messenger, 2018). In this context, Karl Marx also emphasized the importance of working time as a fundamental factor for the physical and social well-being of workers (Marx, 1867/modern editions).

By the late nineteenth century, the movement for the eight-hour workday gained particular momentum in the United States. In 1884, the Federation of Organized Trades and Labor Unions declared that from May 1, 1886, the eight-hour workday would become standard. This led to mass strikes involving hundreds of thousands of workers. The events surrounding the Haymarket affair in Chicago in May 1886 resulted in casualties and significant public reaction, becoming a pivotal moment in the history of the labor movement and a symbol of the struggle for workers’ rights (Encyclopaedia Britannica, n.d.; Library of Congress, 2024).

At the international level, efforts to limit working time were reflected in the institutional development of labor legislation. After World War I, the issue of working time became central to international policy. In 1919, with the establishment of the International Labour Organization, Convention No. 1 on working time in industry was adopted,

establishing a standard of eight hours per day and 48 hours per week (International Labour Organization, 1919). This represents the first international regulatory act formalizing the limitation of working time.

During the first half of the twentieth century, these principles began to be applied in practice within industrial enterprises. One of the most well-known examples is the introduction in 1926 of a five-day workweek and a 40-hour work schedule at Ford Motor Company, without reducing wages. This decision demonstrated the relationship between reduced working time, increased productivity, and the development of mass consumption (History.com Editors, n.d.; Messenger, 2018).

Additionally, the process of introducing the eight-hour workday occurred at different rates across the world. In countries such as New Zealand and Australia, partial successes were achieved for certain categories of workers as early as the second half of the nineteenth century, whereas in most industrialized countries full implementation was realized only during the first half of the twentieth century through legislative reforms (International Labour Organization, 2020).

The first international treaty to address the duration of the working day was the Treaty of Versailles, specifically in the annex to its Part XIII, which established the International Labour Office (now the International Labour Organization). The eight-hour workday was the first issue discussed by the ILO, resulting in the adoption of the 1919 Hours of Work Convention, ratified by 52 countries as of 2016.

In conclusion, the development of the eight-hour workday represents a long and evolutionary process shaped by the interaction of economic, social, and political factors. The transition from prolonged and unregulated labor to standardized working time is the result of both the pressure of labor movements and the institutionalization of labor rights at national and international levels (Messenger, 2018; International Labour Organization, 2020).

### 2.2. Global Practices in the Implementation of the Eight-Hour Workday

UNITED KINGDOM

The United Kingdom is among the countries where some of the most large-scale experiments with the four-day workweek have been conducted in recent years. Following the pilot project in 2022, organized by researchers from Boston College, the University of Cambridge, and the organization 4 Day Week Global, interest in this model has increased significantly. The experiment involved 61 companies and approximately 2,900 employees working under the 100–80–100 model—100% pay, 80% working time, and 100% productivity (Autonomy, 2023; 4 Day Week Global, 2023).

The results published in 2023 show that around 92% of participating companies decided to continue with the four-day workweek, with a significant proportion adopting it as a permanent practice. The study reports substantial improvements in employee well-being, including reduced stress and burnout, improved sleep quality, and higher job satisfaction (Autonomy, 2023; Boston College, 2023).

In terms of economic outcomes, companies reported an average revenue increase of approximately 1.4% during the pilot period, indicating that reduced working time does not lead to a decline in productivity (Autonomy, 2023). This finding empirically challenges the traditional assumption of a direct relationship between working time and productivity.

As of 2024–2025, the United Kingdom remains one of the countries with the most active interest in this model. The organization 4 Day Week Campaign continues to promote experiments with the four-day workweek, with an increasing number of companies in sectors such as technology, marketing, consulting, and creative industries adopting similar practices (4 Day Week Campaign, 2024). However, the model is not legally regulated at the national level and is mainly implemented as a voluntary organizational policy (BBC News, 2019; Eurofound, 2023).

At the same time, the debate on working time remains active at the political level. Representatives of the Labour Party have repeatedly expressed support for experiments with a four-day workweek as part of broader policies aimed at improving working conditions and work–life balance (BBC News, 2019).

ICELAND

Iceland is among the first countries to conduct large-scale experiments with reduced working time.

Between 2015 and 2019, two major pilot projects were carried out by the Reykjavik City Council and the national government in cooperation with trade unions. In these experiments, the working week was reduced from 40 to 35–36 hours without a reduction in pay (Autonomy, 2021; Association for Sustainability and Democracy, 2021).

The experiments involved approximately 2,500 employees, representing about 1% of the country's workforce (Autonomy, 2021). The results show that reduced working time did not lead to a decline in productivity, with some cases even demonstrating improvements in efficiency (Autonomy, 2021; OECD, 2022). From a social perspective, employees reported significant improvements in work–life balance, reduced stress and burnout, and increased job satisfaction (Autonomy, 2021; OECD, 2022).

Following the completion of the pilots, the results led to widespread renegotiation of collective agreements, allowing a large share of employees to transition to shorter working hours or more flexible working arrangements (Autonomy, 2021). By 2023–2024, it is estimated that between 80% and 90% of Icelandic workers have access to reduced working hours or flexible work arrangements without pay reduction (Autonomy, 2021; OECD, 2023).

UNITED STATES

In the United States, the four-day workweek is not widely implemented at the national level, but interest has been growing in recent years, particularly in the private sector. One of the most cited examples is the experiment conducted by Microsoft Japan (although outside the U.S.), which stimulated global interest in the model, including among American companies (Kleinman, 2019). Within the U.S., several organizations have conducted pilot projects in collaboration with 4 Day Week Global, applying the 100–80–100 model (4 Day Week Global, 2023).

Empirical findings from these pilots indicate improvements in employee well-being, including reduced stress and burnout, without significant declines in productivity (Boston College, 2023). In parallel, Gallup data show that American workers are among those most affected by burnout in developed economies, further increasing interest in alternative work arrangements (Gallup, 2023).

JAPAN

Working time in Japan has traditionally been characterized by high intensity and extensive overtime. Data from the Ministry of Health, Labour and Welfare indicate that a significant proportion of employees work overtime, with some exceeding 80 hours per month—a threshold associated with increased health risks (MHLW, 2017; OECD, 2022).

The culture of long working hours is deeply rooted and linked to the phenomenon of karoshi (death from overwork). In response, the government has introduced initiatives such as "Premium Friday" and has encouraged companies to adopt more flexible working arrangements (OECD, 2022; METI, 2017).

In recent years, the Japanese government has also recommended that companies consider implementing a four-day workweek as a voluntary measure (Government of Japan, 2021; Reuters, 2021). Despite these efforts, adoption remains limited, reflecting the persistence of traditional work culture.

**Table 1**

**International Practices in the Implementation of the Four-Day Workweek**

| Country | Initiative / Program | Model (Work–Pay–Productivity) | Observed Effects | Implementation Status |
|---|---|---|---|---|
| **United Kingdom** | Pilot project (2022–2023) – 4 Day Week Global | 100–80–100 | Reduced stress, higher satisfaction, stable or slightly increased productivity | Partial – voluntary adoption by individual companies |
| **Iceland** | National trials (2015–2019) | 40 → 35–36 hours | Maintained productivity, improved work–life balance | Widely implemented via collective agreements |

| Country | Initiative / Program | Model (Work–Pay–Productivity) | Observed Effects | Implementation Status |
|---|---|---|---|---|
| **USA** | Pilot programs (2022–2024) | Primarily 100–80–100 | Improved mental health, reduced turnover, no productivity decline | Limited – mainly in tech and creative sectors |
| **Japan** | Corporate experiments (2019–2024) | Company-level four-day workweek | Increased productivity (e.g., Microsoft Japan +40%), reduced costs | Politically encouraged, but not widely adopted |

*Source: Authors' Compilation, 2026.*

The analysis of the data clearly indicates that the implementation of the four-day workweek follows different models depending on the institutional environment, economic structure, and cultural characteristics of individual countries.

First, the absence of a universal implementation model is evident. In countries such as the United Kingdom and the United States, the four-day workweek is primarily developing through pilot projects and voluntary company initiatives, whereas in Iceland it has been more widely adopted through the mechanism of collective bargaining. This suggests that institutional support—particularly through trade unions and labor agreements—is a key factor in scaling the model.

Second, the results are relatively consistent across different contexts, showing improvements in employee well-being, including reduced stress and increased job satisfaction, while maintaining or slightly increasing productivity. These findings challenge the traditional assumption of a direct relationship between working time and efficiency.

Third, significant differences can be identified in terms of the level of implementation. Iceland represents an example of a systemic transformation of working time, while in Japan and the United States the model remains partial and sector-specific. The United Kingdom, in turn, appears to be in a transitional phase between experimentation and broader adoption.

Finally, the analysis highlights the important role of cultural factors. In countries with traditionally long working hours, such as Japan, the implementation of the model is slower and more limited, despite the presence of political support. In contrast, in countries with more flexible labor practices, such as Iceland, the transition to reduced working time has been considerably more successful.

In summary, the four-day workweek cannot be regarded as a universal solution, but rather as a context-dependent model whose effectiveness is determined by the interaction of economic, institutional, and cultural factors.

### 2.3. Bulgarian Legislation – Opportunities for Change

According to § 1, item 11 of the Additional Provisions of the Labour Code, "working time" is defined as any period during which the employee is obliged to perform the work agreed upon. This definition outlines the fundamental legal framework governing the duration and organization of working time in Bulgaria.

Pursuant to Article 136, paragraphs 1 and 3 of the Labour Code, the normal duration of working time is up to 40 hours per week within a five-day working week, with a normal daily duration of up to 8 hours. It should be emphasized that these values are defined as "normal," which allows for the application of various working time arrangements, provided that the established maximum limits and minimum rest requirements are observed.

The distribution of working time is determined by the employer and regulated through the internal labor regulations of the enterprise (Article 139, paragraph 1 of the Labour Code). In this regard, the employer has operational autonomy to organize the work process and select appropriate forms of working time distribution and accounting, including the use of aggregated working time calculation (Article 142 of the Labour Code), while complying with requirements for daily and weekly rest periods (Articles 152 and 153), as well as breaks during the working day (Article 151).

In this context, Bulgarian labor legislation does not contain explicit provisions regulating a four-day

workweek, nor does it impose a direct prohibition on the implementation of such flexible models. In practice, such arrangements can be realized through various organizational approaches, such as compressed workweeks (redistribution of the standard 40 hours over fewer working days) or through a reduction in the total working time.

However, it should be noted that reducing working time may affect the level of remuneration and, consequently, the social security income, particularly when not compensated by organizational or productivity improvements. This may, in turn, influence future social and pension entitlements, representing a significant practical consideration in assessing the applicability of such models.

Discussions regarding the optimal duration of working time and the need for more flexible work arrangements are also intensifying at the European level. In this context, statistical studies on time use play a crucial role. During the period 2022–2023, the National Statistical Institute conducted the harmonized European Time Use Survey, which provides internationally comparable data on how individuals allocate their time between paid work, unpaid activities, caregiving, and personal life.

The results of such studies are relevant both for the development of public policies and for managerial practices within organizations. They provide a basis for a deeper understanding of the needs of modern employees and for assessing the potential for introducing flexible working time arrangements, including a four-day workweek.

Despite the absence of explicit legal regulation of a four-day workweek, the existing legal framework allows for the implementation of various flexible working time arrangements. The Labour Code establishes the maximum normal duration of working time but does not preclude alternative distributions of working hours, provided that mandatory rest periods and occupational safety requirements are respected.

One of the possible approaches to implementing a four-day workweek is through a compressed work schedule, whereby the standard 40-hour weekly workload is distributed across four working days. Another approach involves reducing the total working time (e.g., to a 32-hour workweek), which, however, implies corresponding adjustments in wage systems and social security contributions.

Despite these legal possibilities, the practical implementation of such a model is associated with several constraints. These include the need for reorganization of work processes, the specific characteristics of certain economic sectors (e.g., continuous production and service operations), and potential economic implications for employers' costs.

Furthermore, when reduced working time is accompanied by lower remuneration, this may result in decreased social security income and, consequently, reduced future social and pension benefits for employees.

A key factor for the successful implementation of a four-day workweek is the level of organizational readiness, including the degree of digitalization, the use of results-oriented management practices, and the capacity for effective planning and allocation of work tasks.

In this sense, the introduction of a four-day workweek in Bulgaria should be viewed not primarily as a matter of legal permissibility, but rather as a function of organizational maturity, economic feasibility, and the degree of social consensus. The development of public debates, scientific research, and practical business experiments could create conditions for the broader adoption of flexible working time models in the future.

### 2.4. Theoretical Foundations of the Concept of Work–Life Balance

In recent years, work–life balance has attracted increasing attention both in academic research and in human resource management practice. This is due to the fact that modern individuals perform multiple roles—both in the professional and personal spheres—which often leads to elevated levels of stress when these roles must be managed simultaneously. Each of these roles is characterized by specific responsibilities, obligations, requirements, and expectations that demand significant psychological and physical resources.

When an imbalance occurs between these resources, role conflict emerges. The conflict between work and family represents a form of inter-role conflict, in which the pressures arising from professional and family roles are mutually incompatible—participation in one role makes it more difficult to fulfill the other (Naidenova and Batalova, 2023). This incompatibility between roles is also discussed in the seminal study by Greenhaus and Beutell (1985), who define work–family conflict as a major source of tension in the

contemporary work environment.

Prolonged exposure to such conflict can lead to excessive stress, exhaustion, and burnout, reducing the individual's ability to perform effectively in both professional and personal domains. The causes of stress are diverse and may be related to personal life (family situations, emotional states, health problems) as well as to the work environment (job-related difficulties, interpersonal conflicts, financial pressure).

Time represents a key resource in the fulfillment of different roles. Time pressure and the inability to meet all demands simultaneously lead to the accumulation of tension and stress. In the workplace, factors such as high workload, long working hours, conflicts with colleagues, lack of support and feedback, demotivation, excessive control, or overcommitment contribute to increased stress and, in the long term, may result in the depletion of personal resources and burnout.

Numerous studies indicate that employees exposed to such factors are more vulnerable to physical and mental health problems, as well as to lower levels of job and life satisfaction, including dissatisfaction in family and marital relationships (Naidenova and Batalova, 2023). The conflict between professional and personal responsibilities is particularly pronounced among individuals with children or those caring for dependent family members.

In an effort to mitigate the negative effects of overload and exhaustion, an increasing number of individuals seek ways to restore their physical and emotional resources. This includes spending time with family, engaging in fulfilling activities, and adopting stress-reduction practices. At the same time, organizations are becoming increasingly aware of the importance of creating a healthy work environment and are implementing measures to enhance employee well-being.

In this sense, work–life balance is a contemporary concept that describes how individuals allocate their time and energy between professional responsibilities and personal needs, exerting a significant influence on health, stress levels, well-being, quality of life, and organizational effectiveness (Sánchez-Hernández et al., 2019). Balance implies the ability of employees to establish clear boundaries between work and personal time, ensuring that professional commitments do not deplete the resources necessary for rest, family, and personal interests.

From a theoretical perspective, this balance can be examined through the concept of boundary management between roles. According to Clark (2000), work–life balance is a process of managing the boundaries between the two domains, in which individuals strive to harmonize their multiple roles. Guest (2002) further argues that achieving balance depends both on individual strategies and on organizational policies that enable flexible work arrangements.

In this context, flexible forms of work organization are considered a key instrument for achieving better work–life balance. In recent years, the introduction of a four-day workweek has been increasingly discussed as a potential solution for optimizing working time and improving employee well-being. The core idea of this model is that through more efficient time and process management, the same or even higher levels of productivity can be achieved, while providing more time for recovery and personal activities.

From a human resource management perspective, such practices are viewed as a means of enhancing motivation, reducing stress, and preventing burnout. Providing more free time creates conditions for the restoration of employees' physical and psychological resources, which can lead to higher engagement, productivity, and job satisfaction.

In conclusion, work–life balance is increasingly recognized as a key element of modern human resource management policies, while the introduction of alternative working time models, such as the four-day workweek, is seen as a promising approach for achieving a more sustainable and effective integration of professional and personal responsibilities.

## 3. Methods

### 3.1. Research Design

The present study employs a research design based on a structured questionnaire survey aimed at analyzing employees' and managers' attitudes toward the four-day workweek and its perceived impact on key organizational and individual outcomes. The study follows a descriptive and exploratory approach, as it seeks

to identify patterns in perceptions related to work–life balance, including productivity, motivation, and workplace stress, without testing a strictly predefined causal model.

### 3.2. Instrument Development

The data collection instrument consists of a self-administered questionnaire, developed specifically for the purposes of the study.

The questionnaire is structured into several thematic sections:

- demographic characteristics (gender, position, sector, work schedule);
- attitudes toward the four-day workweek;
- perceived impact on key factors;
- expectations and personal experience.

A number of items are measured using a five-point Likert scale (1 = very low / strongly disagree; 5 = very high / strongly agree), enabling the assessment of the perceived impact of the four-day workweek on work–life balance.

### 3.3. Sample and Data Collection

The empirical study is based on a convenience sample of 15 respondents, including both employees and individuals in managerial positions from different economic sectors.

Data were collected through the distribution of the questionnaire among participants from:

- private sector organizations;
- public institutions;
- non-governmental organizations.

The aim of this stage is to gather empirical insights into:

- attitudes toward the four-day workweek;
- perceived benefits;
- feasibility of the four-day workweek in Bulgaria.

### 3.4. Data Analysis

The collected data were processed and analyzed using descriptive statistical methods, including: frequency distributions, percentage analysis and mean values.

The results are presented through tables and graphical visualizations, allowing for the identification of key trends in respondents' attitudes.

### 3.5. Limitations of the Study

The study has several limitations that should be considered when interpreting the results:

- The small sample size (n=15) limits the generalizability of the findings;
- The use of a convenience sampling approach does not ensure full representativeness;
- The results are based on self-reported perceptions, which may be subject to subjective bias.

Despite these limitations, the study provides valuable exploratory insights into the applicability of the four-day workweek in the Bulgarian context.

It should be noted that the present report provides a partial analysis of the questionnaire, while the full results will be presented in a subsequent study.

## 4. Results and Discussion

### 4.1. Characteristics of the Sample

The empirical study includes 15 respondents, comprising both employees and individuals in managerial positions. The main objective is to analyze attitudes toward the four-day workweek and its perceived impact on work–life balance, including productivity, motivation, and stress.

**Table 2**

**Sample Characteristics**

| Indicator | Category | Count | Share (%) |
|---|---|---|---|
| **Gender** | Female<br>Male | 8<br>7 | 53%<br>47% |
| **Position** | Employees<br>Managers | 9<br>6 | 60%<br>40% |
| **Sector** | Private<br>Public<br>NGO | 10<br>2<br>3 | 67%<br>13%<br>20% |
| **Work schedule** | 5-day week<br>4-day week | 13<br>2 | 87%<br>13% |

*Source: Author's Compilation.*

The results indicate that the majority of respondents are employed under a traditional five-day workweek, which provides a relevant basis for assessing perceptions of the four-day workweek as an alternative work arrangement.

### 4.2. Attitudes Toward the Four-Day Workweek

A key question in the survey concerns the level of support for introducing a four-day workweek.

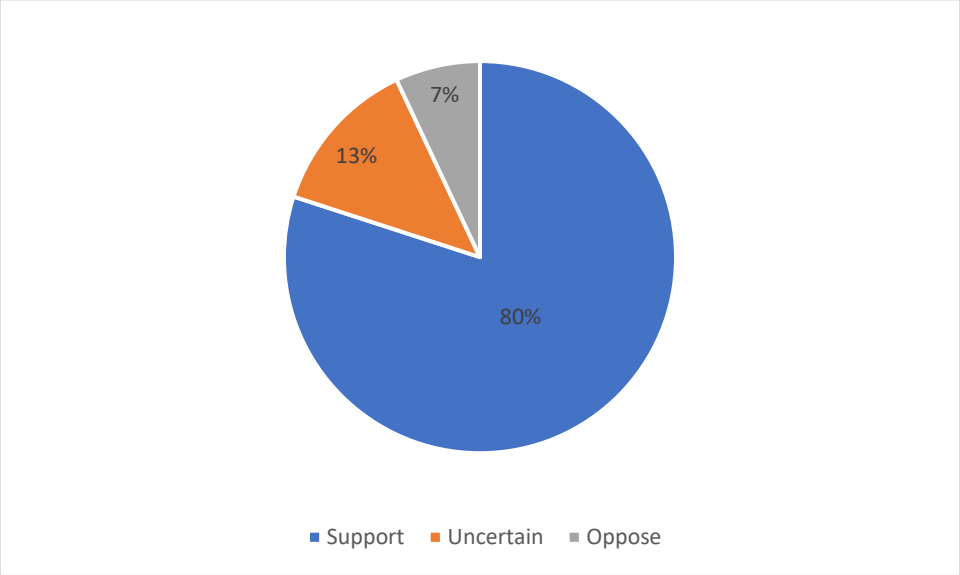



**Fig. 1. Support for the Four-Day Workweek**

*Source: Own Elaboration.*

The findings reveal a strong positive attitude toward the adoption of a four-day workweek. A significant majority (80%) express support, while only a small proportion are uncertain or opposed.

A more detailed examination by position suggests that managers demonstrate more cautious attitudes, whereas employees are more supportive. This pattern can be explained by managerial responsibility for maintaining productivity, coordinating workflows, and ensuring organizational performance.

### 4.3. Perceived Impact on Work–Life Balance

An essential dimension of the study is the perceived impact of the four-day workweek on work–life balance.

**Table 3**

**Perceived Impact on Work–Life Balance**

| Evaluation Count | Count | Share (%) |
|---|---|---|
| **Very positive** | **10** | **67%** |
| **Rather positive** | **4** | **27%** |
| **No change** | **1** | **6%** |
| **Negative** | **-** | **-** |

*Source: Author's Compilation.*

The results demonstrate an overwhelmingly positive perception of the four-day workweek in terms of work–life balance. A total of 94% of respondents report either a very positive or rather positive effect, while no respondents indicate negative consequences.

These findings align with existing international research, which suggests that reduced working time contributes to:

- improved recovery and well-being
- increased time for family and personal activities
- enhanced overall life satisfaction

### 4.4. Descriptive Statistics of Perceived Impact

Participants in the study evaluated the perceived impact of the four-day workweek on several key organizational and individual factors using a five-point Likert scale (1 – very low impact; 5 – very high impact).

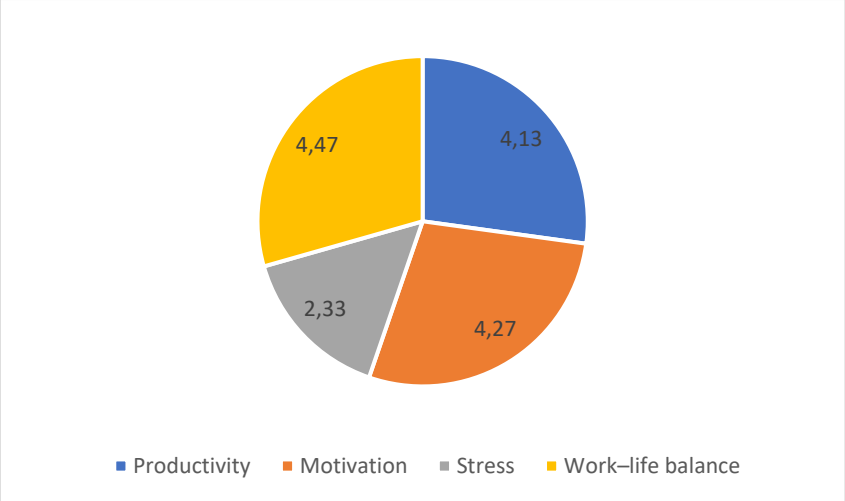



**Fig. 2. Mean Values of Evaluations**

*Source: Own Elaboration.*

The results reveal several clear trends regarding the perceived effects of the four-day workweek.

First, motivation receives one of the highest mean scores (4.27), indicating that respondents associate reduced working time with increased engagement, job satisfaction, and intrinsic motivation.

The highest score is observed for work–life balance (4.47), confirming that this dimension is the most strongly influenced by the introduction of a four-day workweek. This finding highlights the importance of time flexibility as a key determinant of employee well-being.

At the same time, productivity is also rated relatively high (4.13), suggesting that respondents do not expect a decline in efficiency when adopting this work model. This implies that reduced working time may be compensated by improved focus and more efficient work organization.

An interesting finding concerns work-related stress, which receives a significantly lower mean score (2.33). This suggests that respondents expect a reduction in psychological strain and an improvement in overall working conditions, in line with contemporary research on employee well-being.

Overall, the descriptive analysis indicates that the four-day workweek is perceived as a model that simultaneously:

- improves work–life balance
- enhances motivation
- maintains or improves productivity
- reduces stress levels.

### 4.5. Perceived Feasibility of the Four-Day Workweek in Bulgaria

An important dimension of the empirical study concerns the perceived feasibility of implementing the four-day workweek within the Bulgarian economic and organizational context.

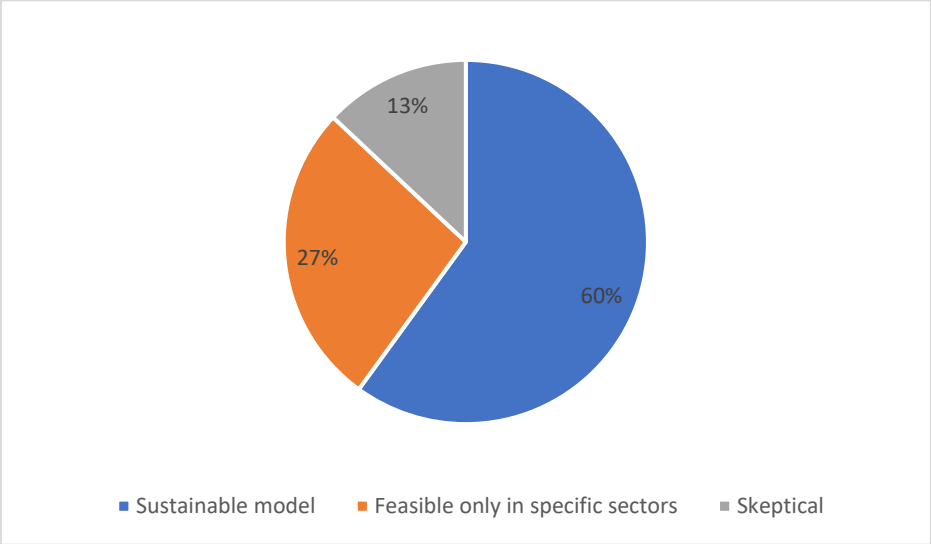



**Fig. 3. Perceived Sustainability of the Four-Day Workweek in Bulgaria**

*Source: Own Elaboration.*

The findings indicate that the majority of respondents perceive the four-day workweek as a potentially sustainable model in Bulgaria. However, a notable proportion (27%) believe that its implementation is feasible only in certain economic sectors, highlighting the presence of sector-specific constraints.

A relatively small share of respondents (13%) express skepticism regarding the applicability of the model, suggesting that negative attitudes are not dominant but remain relevant.

The analysis further reveals that the main concerns are related to:

- the specific characteristics of certain sectors (e.g., manufacturing, continuous service operations)
- organizational structures of enterprises
- the need for significant reorganization of work processes.

Overall, the results suggest that the successful implementation of a four-day workweek in Bulgaria requires a context-sensitive and differentiated approach, taking into account sectoral and organizational specificities.

### 4.6. Discussion

The overall analysis of the empirical results indicates that the four-day workweek is perceived as a

potentially effective tool for improving the quality of working life. The most pronounced expected impact relates to improvements in work–life balance, as evidenced by both the high mean values and the predominantly positive evaluations provided by respondents.

These findings are consistent with established trends in the scientific literature, which suggest that reduced working time contributes to better recovery, enhanced well-being, and higher life satisfaction (Maslach and Leiter, 2016; ILO, 2021). In this context, the four-day workweek can be interpreted as a mechanism for reducing occupational stress and preventing burnout.

An important insight from the study is that respondents associate this work model not only with improved well-being, but also with increased motivation and engagement. This aligns with theoretical perspectives in human resource management, which emphasize the role of flexible work arrangements in enhancing intrinsic motivation and organizational commitment.

Another notable aspect concerns the perceived impact on productivity, which remains relatively high. This suggests that reduced working time is not viewed as a threat to efficiency, but rather as an opportunity for optimizing work processes. This finding is supported by previous research indicating that shorter working hours can lead to improved concentration and more efficient use of resources (Pencavel, 2015; OECD, 2020).

Despite the predominantly positive attitudes, the results also highlight the presence of certain reservations, particularly regarding the applicability of the model in the Bulgarian context. Some respondents believe that the four-day workweek is suitable only for specific economic sectors, emphasizing the importance of sectoral characteristics and organizational constraints.

Furthermore, the more cautious attitude observed among managers points to the need for adjustments in management practices, including:

- reorganization of work processes
- implementation of results-oriented management approaches
- effective allocation of tasks and resources

These findings confirm that the introduction of a four-day workweek should not be considered an isolated change, but rather part of a broader transformation of organizational models and management practices.

In summary, the results indicate that the four-day workweek has significant potential as a tool for enhancing work–life balance and employee well-being. However, its successful implementation requires a systematic and context-sensitive approach, tailored to specific organizational and sectoral conditions.

## 5. Conclusion

In conclusion, the present study demonstrates that the four-day workweek can be considered a multidimensional model of work organization, influenced by economic, institutional, and socio-cultural factors. The analysis of the theoretical framework and international practices confirms that reduced working time has the potential to improve employee well-being without compromising organizational productivity.

The empirical findings indicate that respondents associate this model with better work–life balance, higher motivation, and lower stress levels, while not expecting a significant decline in productivity. This challenges the traditional assumption of a direct relationship between working time and efficiency.

However, the implementation of the four-day workweek is context-dependent, relying on sector-specific characteristics, organizational structures, and management practices. In the Bulgarian context, the existing legal framework allows for flexible working time arrangements, but their adoption requires organizational readiness and economic feasibility.

Overall, the four-day workweek emerges as a promising approach to improving work–life balance, requiring a systematic and adaptive approach to its implementation.

Further research could focus on expanding the empirical base through larger and more representative samples, as well as applying longitudinal designs to assess the long-term effects of the four-day workweek on organizational performance and employee well-being. Additionally, comparative sectoral analyses would provide deeper insights into the conditions under which this model can be most effectively implemented.

**Acknowledgement**

The authors express their gratitude to the Bulgarian Scientific Research Fund, Ministry of Education and Science of Bulgaria for the support provided in the implementation of the project "Impact of digitalization on innovative approaches in human resources management", Grant No. BG-175467353-2022-04/12-12-2022, contract No. KP-06-H-65/4 – 2022. The authors have no conflicts of interest to disclose.

**References**

1. 4 Day Week Campaign. (2024). Four Day Week Campaign UK. Available at: https://www.4dayweek.co.uk (Accessed: 12 September 2025).
2. 4 Day Week Global. (2023). Pilot Programme Results. Available at: https://www.4dayweek.com (Accessed: 18 August 2025).
3. Association for Sustainability and Democracy. (2021). Going Public: Iceland's Journey to a Shorter Working Week. Reykjavík.
4. Autonomy. (2021). The Icelandic Working Time Reduction: Results of the Trials. London: Autonomy.
5. Autonomy. (2023). The UK Four-Day Week Pilot Results. London: Autonomy.
6. BBC News. (2019). Four-day week: What do politicians say? Available at: https://www.bbc.com (Accessed: 05 October 2025).
7. Boston College. (2023). The UK Four-Day Week Pilot Results. Boston.
8. Clark, S.C. (2000). Work/family border theory: A new theory of work/family balance, *Human Relations, 53*(6), pp. 747–770. Available at: https://doi.org/10.1177/0018726700536001
9. Encyclopaedia Britannica (n.d.) Haymarket Affair. Available at: https://www.britannica.com (Accessed: 22 August 2025).
10. Eurofound. (2023). Working time developments in Europe. Luxembourg: Publications Office of the European Union.
11. European Union. (2003). Directive 2003/88/EC of the European Parliament and of the Council concerning certain aspects of the organisation of working time. Official Journal of the European Union.
12. Gallup. (2023). State of the Global Workplace. Available at: https://www.gallup.com (Accessed: 30 September 2025).
13. Government of Japan. (2021). Economic Policy Guidelines. Tokyo.
14. Greenhaus, J.H. and Beutell, N.J. (1985). Sources of conflict between work and family roles, *Academy of Management Review, 10*(1), pp. 76–88. Available at: https://doi.org/10.5465/amr.1985.4277352
15. Guest, D.E. (2002). Perspectives on the study of work–life balance, *Social Science Information, 41*(2), pp. 255–279. Available at: https://doi.org/10.1177/0539018402041002005
16. History.com Editors (n.d.) Henry Ford and the Five-Day Workweek. Available at: https://www.history.com (Accessed: 14 August 2025).
17. International Labour Organization. (1919). Hours of Work (Industry) Convention, 1919 (No. 1). Geneva: ILO.
18. International Labour Organization. (2020). Working Time and Work-Life Balance Around the World. Geneva: ILO.
19. International Workingmen's Association. (1866). Instructions for the Delegates of the Provisional General Council. Geneva: IWMA.
20. Kleinman, Z. (2019). Microsoft Japan tests four-day week, *BBC News.*
21. Library of Congress. (2024). The Haymarket Affair. Available at: https://www.loc.gov (Accessed: 09 September 2025).
22. Marx, K. (1867). Capital: A Critique of Political Economy. Vol. 1. Various modern editions.
23. Messenger, J.C. (2018). Working Time and the Future of Work. Geneva: International Labour Organization.
24. Ministry of Economy, Trade and Industry Japan. (2017). Premium Friday Initiative. Tokyo.
25. MHLW. (2017). White Paper on Labour Economy. Tokyo.

26. Naidenova, V. and Batalova, D. (2023). Konflikt rabota–lichen zhivot: rezultati ot empirichno izsledvane v Bulgaria [Work–life conflict: results from an empirical study in Bulgaria], *Bulgarsko spisanie po psihologia, 1–4.*

27. National Statistical Institute. (2023). Time Use Survey 2022–2023. Available at: https://www.nsi.bg (Accessed: 27 September 2025).

28. OECD. (2022). Working time and productivity. Paris: OECD Publishing.

29. OECD. (2023). OECD Employment Outlook 2023. Paris: OECD Publishing.

30. Republic of Bulgaria. Labour Code. (2026). Available at: https://www.gli.government.bg/sites/default/files/upload/documents/2026-02/%D0%9A%D0%BE%D0%B4%D0%B5%D0%BA%D1%81%20%D0%BD%D0%B0%20%D1%82%D1%80%D1%83%D0%B4%D0%B0.pdf (Accessed: 03 October 2025).

31. Reuters. (2021). Japan encourages four-day workweek. Available at: https://www.reuters.com (Accessed: 11 September 2025).

32. Sánchez-Hernández, M.I., González-López, Ó.R., Buenadicha-Mateos, M. and Tato-Jiménez, J. L. (2019). Work–life balance in great companies and pending issues for engaging new generations at work, *International Journal of Environmental Research and Public Health, 16*(24), p. 5122. Available at: https://doi.org/10.3390/ijerph16245122

33. Skidelsky, R. (2019). Money and Government: The Past and Future of Economics. London: Penguin.

ISSN (Online): 2815-5084

INTERNATIONAL SCIENTIFIC AND PRACTICAL CONFERENCE ON HUMAN RESOURCE MANAGEMENT
DOI: 10.56065/HRM/2026.208, pp. 208 – 213

7th edition, 3 October 2025
University of Economics-Varna

# Women's Leadership in the Educational System of Israel

**Marlene FARIS**[1]

[1]Ph.d. student, Varna Free University „Chernorisets Hrabar", Bulgaria, e-mail: mrlynprs286@gmail.com)

**JEL: O14, P24, C41, E13**

**Key words:**
Manufacturing output, National savings, inflation, labour force, VECM.

**Abstract**

This paper examines women's leadership in the educational system of Israel, with particular focus on female school principals in Arab society. *Background and aim*: Drawing on organizational leadership theory, sociocultural perspectives on gender, and empirical findings from a dissertation on teachers' perceptions of women principals, the study explores how leadership styles, school climate, and teacher self-efficacy shape attitudes toward women in educational leadership. *Methods*:The analysis highlights the role of pedagogical and transformational leadership in mediating traditional gender norms and fostering professional legitimacy. *Results*: The paper argues that schools can function as sites of sociocultural transformation, where professional standards and ethical leadership challenge patriarchal assumptions and promote gender equity in educational management.

**Published by University of Economics – Varna**

*Citation:* Faris, M. (2026). Women's Leadership in the Educational System of Israel. *Proceedings from 7th International Scientific and Practical Conference on Human Resource Management (ICHRM).* University of Economics-Varna, pp. 208 – 213. DOI: 10.56065/HRM/2026.208

## 1. Introduction

Educational leadership is widely recognized as a central factor influencing school effectiveness, teacher motivation, and student achievement. In recent decades, attention has increasingly turned to the role of women in educational leadership, particularly within sociocultural contexts shaped by traditional gender norms and patriarchal structures. In Israel, women have achieved high levels of participation in teaching and educational training; however, their representation in senior leadership positions, especially in minority communities, remains uneven.

Within Arab society in Israel, women's access to school leadership positions is shaped by a complex interaction between professional qualifications, organizational structures, and cultural expectations regarding gender roles, family responsibilities, and public authority. Female principals often navigate dual expectations: demonstrating professional competence while simultaneously negotiating culturally embedded assumptions about women's legitimacy as leaders.This paper is based on a dissertation that investigated teachers' perceptions of female principals in Arab schools in Israel. By situating these findings within broader theoretical frameworks of leadership and gender, the paper seeks to contribute to the understanding of how educational organizations can either reproduce or challenge social inequalities

## 2. Literature Review and Hypotheses Development

### 2.1 Organizational Leadership

Organizational leadership theory distinguishes between management, which emphasizes formal authority and task execution, and leadership, which focuses on vision, influence, and the mobilization of people toward shared goals. Leadership is understood as a relational and socially embedded process through which leaders shape organizational culture, motivate followers, and guide long-term development.

Adizes' model of management styles highlights the balance between effectiveness and efficiency, as well as short-term and long-term orientations. Effective organizations benefit from leaders who combine task orientation, administrative efficiency, entrepreneurial vision, and integrative collaboration. In educational contexts, this balance is particularly significant because schools operate simultaneously as formal institutions and moral communities.

### 2.2 Leadership Styles

Two dominant leadership styles are central to the literature: transactional and transformational leadership. Transactional leadership is based on exchanges between leaders and followers, such as rewards for performance and compliance. Transformational leadership, in contrast, emphasizes vision, inspiration, individualized consideration, and intellectual stimulation. Transformational leaders seek to foster intrinsic motivation, professional growth, and shared commitment to organizational values.

The "full range leadership model" situates leadership styles along a continuum from passive and avoidant approaches to highly proactive and transformational ones. Research in education consistently suggests that transformational and pedagogical leadership styles are more effective in promoting teacher empowerment, positive school climate, and student achievement.

### 2.3 Sociocultural Perspectives on Gender

Sociocultural theories of gender argue that leadership identities are socially constructed and shaped by cultural narratives about authority, legitimacy, and appropriate roles for men and women. In patriarchal societies, leadership is often associated with masculinity, which can marginalize women's access to authority and shape the criteria by which their performance is evaluated.

Rosabeth Moss Kanter's theory of structural inequality emphasizes that gender differences in behavior and aspirations are often the result of organizational positions rather than inherent traits. When women occupy minority positions in leadership hierarchies, they face heightened scrutiny, role conflict, and pressure to conform to dominant norms.

In minority contexts such as Arab society in Israel, gender dynamics intersect with broader issues of cultural identity, social expectations, and political marginalization, creating unique challenges for women in leadership roles.

### 2.4. Educational Leadership in the Israeli Context

#### 2.4.1 The School Principal as Leader

The school principal occupies a dual role as both administrator and educational leader. Beyond managing resources, schedules, and compliance with policy, the principal is responsible for shaping the school's vision, fostering professional collaboration, and building relationships with teachers, students, parents, and the wider community.

Educational leadership literature emphasizes moral and pedagogical dimensions of the principal's role. Principals are expected to promote ethical conduct, fairness, and inclusion, while also guiding teaching and learning processes. Effective principals create learning communities that support professional development, shared decision-making, and innovation.

#### 2.4.2 Pedagogical Leadership

Pedagogical leadership focuses on the quality of teaching and learning as the core mission of the school. Principals who adopt this style engage directly with curriculum development, classroom practices, and assessment. They encourage collaborative reflection among teachers, establish high expectations, and align instructional strategies with a shared educational vision.

Research indicates that pedagogical leadership is associated with improved student outcomes, positive school climate, and increased teacher satisfaction. This style is particularly relevant in contexts facing social and educational challenges, as it emphasizes equity, inclusion, and continuous improvement.

### 2.5. Women in Educational Leadership in Israel

Despite women's numerical dominance in the teaching profession, their representation in school leadership positions has historically lagged behind that of men. Explanations for this disparity include cultural expectations regarding women's primary responsibilities in the home, organizational biases in recruitment and promotion, and limited access to informal networks of power.

Women aspiring to leadership roles often face a "double bind": they are expected to demonstrate assertiveness and authority associated with leadership while also conforming to norms of femininity that emphasize modesty, care, and relational orientation. Failure to meet either set of expectations can result in negative evaluations.

### 2.6. Women Principals in Arab Society in Israel

Female principals in Arab schools operate within a sociocultural environment characterized by strong family and community ties, traditional gender norms, and the minority status of Arab citizens within the Israeli state. These factors influence both their professional opportunities and the ways in which their leadership is perceived.

Research suggests that women in these contexts often need to demonstrate higher levels of competence, education, and professional commitment than their male counterparts to achieve legitimacy. At the same time, schools can serve as spaces where professional norms and ethical leadership practices challenge traditional assumptions about gender roles.

## 3. Material and Methods

This study employed a quantitative, cross-sectional research design aimed at examining relationships between teachers' perceptions of female principals and key organizational and psychological variables, including leadership style, school climate, and teacher self-efficacy. A correlational approach was selected in order to identify predictive patterns and associations rather than establish causal relationships (Creswell, 2014).

The research framework was informed by transformational and pedagogical leadership theory (Bass, 1999; Sergiovanni, 2007) and sociocultural perspectives on gender and organizational context (Dimmock & Walker, 2006; Oplatka & Hertz-Lazarowitz, 2006).

The research population consisted of teachers working in Arab public schools in Israel that were led by female principals. A stratified sampling approach was used to ensure representation across school levels (elementary, middle, and secondary) and geographic regions.

The final sample included teachers from multiple schools, representing a range of professional seniority, subject specialization, and demographic backgrounds. Participation was voluntary, and all respondents were assured anonymity and confidentiality in accordance with ethical research standards (American Psychological Association [APA], 2020).

Data were collected באמצעות a structured, self-administered questionnaire composed of four main sections:

**1. Leadership Style Scale** – This section measured teachers' perceptions of their principals' leadership practices, drawing on the Full Range Leadership Model (Bass & Avolio, 1995). Items assessed task-oriented leadership, individualized consideration, intellectual stimulation, and corrective or intervention-based behaviors.

**2. Teacher Self-Efficacy Scale** – Based on established measures of professional efficacy, this section examined teachers' confidence in their ability to influence student learning, manage classroom challenges, and contribute meaningfully to school decision-making (Bogler & Somech, 2004).

**3. School Climate and Social Protection Scale** – This scale assessed perceptions of fairness, trust, emotional safety, and mutual respect within the school, reflecting Sergiovanni's (2007) conceptualization of the institutional and cultural dimensions of school climate.

**4. Attitudes Toward Women Principals Scale** – This section measured the extent to which teachers evaluated female leadership in terms of professional competence, legitimacy, and impact on school

effectiveness.

All items were rated on a five-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree). The questionnaire was pilot-tested to ensure clarity, cultural appropriateness, and internal consistency. Reliability coefficients (Cronbach's alpha) for all scales exceeded the acceptable threshold of .70, indicating satisfactory internal reliability (Field, 2018).

Following approval from relevant educational authorities and school administrations, questionnaires were distributed to teachers during staff meetings or via secure online platforms. Participants were informed of the study's purpose, assured that their responses would be used solely for research purposes, and reminded of their right to withdraw at any time.

Data collection took place over a period of several weeks to maximize response rates. Completed questionnaires were coded and entered into a statistical analysis software package for processing and analysis.

Descriptive statistics were used to summarize teachers' demographic characteristics and overall trends in perceptions of leadership, school climate, and self-efficacy. Inferential analyses included Pearson correlation coefficients to examine relationships between variables and multiple regression analyses to identify predictors of positive attitudes toward women principals.

Leadership styles, teacher self-efficacy, and school climate variables were entered as independent variables, while attitudes toward female leadership served as the dependent variable. This analytical approach enabled the identification of the relative contribution of each factor to teachers' overall evaluations of women principals (Field, 2018).

### 3.1. Findings

Overall, teachers reported generally positive perceptions of their female principals. Mean scores indicated moderate to high levels of satisfaction with leadership effectiveness, professional competence, and communication practices. Teachers also expressed relatively high levels of self-efficacy, particularly in relation to instructional planning and student engagement.

Perceptions of the school climate were favorable across most dimensions. Teachers reported strong levels of interpersonal trust, a sense of fairness in administrative decision-making, and a supportive emotional environment. These findings align with prior research emphasizing the importance of ethical and relational leadership in fostering positive school climates (Sergiovanni, 2007; Shlesky & Arieli, 2016).

Pearson correlation analyses revealed significant positive relationships between transformational and pedagogical leadership practices and teachers' attitudes toward women principals. Individualized consideration and intellectual stimulation were particularly strongly associated with perceptions of leadership legitimacy and professional respect (Bass, 1999; Oplatka, 2015).

Teacher self-efficacy was also positively correlated with favorable evaluations of female leadership, suggesting that teachers who felt more confident in their professional roles were more likely to view principals as supportive and effective partners in the educational process (Bogler & Somech, 2004).

The strongest correlations, however, were found between the social protection dimension of school climate and attitudes toward women principals. Schools characterized by high levels of trust, transparency, and emotional safety demonstrated markedly more positive evaluations of female leadership.

Multiple regression analyses identified school climate as the most powerful predictor of positive attitudes toward women principals. The social protection variable alone accounted for a substantial proportion of the variance in teachers' evaluations, even when controlling for leadership style and teacher self-efficacy.

Task-oriented and pedagogical leadership practices emerged as significant secondary predictors. Principals who were perceived as organized, instructional-focused, and professionally competent were more likely to be evaluated positively, regardless of gender.

In contrast, corrective and intervention-based leadership behaviors were negatively associated with teachers' perceptions of female principals. This finding suggests that leadership approaches emphasizing control and disciplinary intervention may undermine professional trust and weaken perceptions of leadership legitimacy (Valentine & Prater, 2011).

The results indicate that organizational context plays a more decisive role than individual leadership traits

in shaping perceptions of women's leadership. When schools foster ethical, fair, and emotionally supportive environments, teachers are more likely to assess female principals on the basis of professional performance rather than gendered expectations.

These findings support sociocultural and organizational theories that view leadership legitimacy as a socially constructed phenomenon influenced by institutional norms and relational dynamics (Dimmock & Walker, 2006; Shapira et al., 2012).

## 4. Implications and Recommendations

**1. Leadership Training Programs**: Professional development initiatives for principals should emphasize pedagogical and transformational leadership skills, with specific attention to gender awareness and cultural competence.

**2. Organizational Climate Development**: Policymakers and school leaders should prioritize the creation of supportive and fair school environments, as these contexts enhance the legitimacy of women's leadership.

**3. Mentorship and Networks**: Establishing mentorship programs and professional networks for aspiring female leaders can help address structural barriers and provide access to informal sources of support.

**4. Community Engagement**: Strengthening partnerships between schools and local communities can help challenge traditional gender norms and promote broader acceptance of women in leadership roles.

## 5. Conclusion

Women's leadership in the educational system of Israel, particularly within Arab society, reflects the intersection of professional practice, organizational culture, and sociocultural norms. While structural and cultural barriers persist, the findings of this study demonstrate that supportive school climates and effective leadership styles can foster positive perceptions of female principals.

By adopting pedagogical and transformational approaches, women leaders can establish professional legitimacy and contribute to the redefinition of leadership norms. Schools thus emerge not only as sites of learning but also as arenas for social transformation, where gender equity and ethical leadership can be actively cultivated.

Were collected via standardized questionnaires measuring attitudes toward leadership, perceptions of organizational climate, and professional self-efficacy.

Statistical analyses were used to identify relationships between leadership practices and teachers' attitudes toward women in leadership roles.

## References

1. Abdullah, S. N., & Ismail, K. N. I. K. (2013). Gender, ethnic and age diversity of the boards of large Malaysian firms and performance. *Jurnal Pengurusan*, *38*, 27–40.

2. Adeniyi, S. I., & Fadipe, A. O. (2018). Effect of board diversity on sustainability reporting in Nigeria: A study of beverage manufacturing firms. *Indonesian Journal of Corporate Social Responsibility and Environmental Management, 1*(1), 43–50.

3. Aifuwa, H. O. (2020). Sustainability reporting and firm performance in developing climes: A review of literature. *Copernican Journal of Finance and Accounting*, *9*(1) Forthcoming

4. Aifuwa, H. O. & Embele, K. (2019). Board characteristics and financial reporting quality. *Journal of Accounting and Financial Management, 5*(1), 30-49.

5. Aifuwa, H. O., Embele, K., & Saidu, M. (2018). Ethical accounting practices and financial reporting quality. *EPRA International Journal of Multidisciplinary Research, 4*(12), 31-44.

6. Aifuwa, H. O & Okojie, P. I. (2015). *Materials and methods: SPSS demystified*. Unpublished manuscript, Samuel Adegboyega University, Ogwa, Nigeria.

7. Aifuwa, H. O., Musa, S. & Gold, N. O. (2020). Audit committee attributes and the timeliness of corporate financial reporting in Nigeria. *Accounting and Finance, 88*(2), 114-124. DOI https://doi.org/10.33146/2307-9878-2020-2(88)-114-124.

8. Aifuwa, H. O., Saidu, M., Enehizena, C. O. & Osazevbaru, A. (2019). Accounting information and

lending decisions: Does sustainability disclosure matter? *Copernican Journal of Finance and Accounting, 8*(4), 61-89. http://dx.doi. org/10.12775/CJFA.2019.018

9. Ali, M., Ng, Y. L., & Kulik, C. (2014). Board age and gender diversity: A test of competing linear and curvilinear predictions. *Journal of Business Ethics*, *125*(3), 497–512. https://doi.org/10.1007/s10551-013-1930-9

10. Aman, Z. & Bakar, N. S. (2018). The influence of board characteristics on sustainability reporting of public listed companies in Malaysia. *Journal of Humanities, Language, Culture and Business, 2*(7), 41-55.

11. Brown, M. E., & Treviño, L. K. (2006). Ethical leadership: A review and future directions. *The Leadership Quarterly*, 17(6), 595–616.

12. Creemers, B., Stoll, L., Reezigt, G., & the ESI Team. (2007). *Effective School Improvement: Capacity for Change and Adaptation*. London: Routledge.

13. Daniel, Y., & Beery, R. (2013). Principals' leadership styles and teachers' disciplinary practices. *Educational Management Administration & Leadership*, 41(1), 75–94.

14. Dimmock, C., & Walker, A. (2006). *Educational Leadership: Culture and Diversity*. London: Sage.

15. Eyal, O., & Roth, G. (2010). Principals' leadership and teachers' motivation. *Educational Administration Quarterly*, 46(2), 256–295.

16. Faris, M.(2026) Women leadership in the educational system of Israel.dissertation, to be printed.

17. Frank, A. (2013). Leadership dimensions in educational management. *International Journal of Educational Leadership*, 8(1), 45–60.

18. Ginat, S. (2018). Women principals' narratives in the Israeli educational system. *Gender and Education*, 30(4), 487–503.

19. Hargreaves, A. (2007). Sustainable leadership and development in education. *Educational Administration Quarterly*, 43(2), 223–256.

20. Kanter, R. M. (1977). *Men and Women of the Corporation*. New York: Basic Books.

21. Leithwood, K., Harris, A., & Strauss, T. (2010). Leading school turnaround. *School Effectiveness and School Improvement*, 21(3), 341–364.

22. McCarley, T. A. (2014). Transformational leadership and school climate. *Journal of Educational Research*, 107(4), 271–283.

23. Oplatka, I. (2015). *The Principalship in Education: Concepts and Practices*. Rotterdam: Sense Publishers.

24. Oplatka, I., & Hertz-Lazarowitz, R. (2006). *Women Principals in a Multicultural Society: New Insights into Feminist Educational Leadership*. Rotterdam: Sense Publishers.

25. Samuel, Y. (2012). *Organizational Behavior: Concepts and Theories*. Tel Aviv: Open University Press.

26. Sergiovanni, T. J. (2007). *Rethinking Leadership: A Collection of Articles*. Thousand Oaks, CA: Corwin Press.

27. Shaked, H., & Schechter, C. (2016). Systems thinking in school leadership: Holistic leadership revisited. *Educational Management Administration & Leadership*, 44(6), 916–932.

28. Shlesky, I., & Arieli, D. (2016). School climate and leadership in multicultural contexts. *International Journal of Educational Research*, 79, 30–41.

29. Valentine, J. W., & Prater, M. (2011). Instructional, transformational, and managerial leadership and student achievement. *Educational Administration Quarterly*, 47(1), 3–38.

30. Wendel, F. C. (2000). Influential schools and social equity. *Educational Policy Analysis Archives*, 8(5), 1–25.

ISSN (Online): 2815-5084

INTERNATIONAL SCIENTIFIC AND PRACTICAL CONFERENCE ON HUMAN RESOURCE MANAGEMENT
DOI: 10.56065/HRM/2026.214, pp. 214 – 218

7th edition, 3 October 2025
University of Economics - Varna

# Perceptions of Female Leadership in Arab Schools: An Analysis of Teachers' Attitudes and Influencing Factors

**Marlene FARIS**[1]

[1]Administration and management, Varna Free University „Çhernorisetz Hrabar", Varna, Bulgaria, marleen.faris@vfu.bg

**Abstract**

This study examines how teachers in Arab schools perceive female principals' leadership, focusing on its impact on school effectiveness, school climate, teacher empowerment, and community status. Using quantitative data from 151 teachers, the study analyzes the relationships among leadership styles, teaching self-efficacy, school social protection climate, and attitudes toward female leadership. Results reveal predominantly positive perceptions of female principals, with task-oriented leadership positively predicting attitudes, while corrective and intervention-oriented styles negatively influenced them. Teaching self-efficacy and school climate also played significant roles in shaping attitudes. These findings contribute to the understanding of gendered leadership perceptions in minority educational contexts.

**Key words:** female, principal, leadership, Arab's teachers, school climate, teacher empowerment, community, attitudes

**Published by University of Education – Varna**

*Citation:* Faris, M. (2026). Perceptions of Female Leadership in Arab Schools: An Analysis of Teachers' Attitudes and Influencing Factors. *Proceedings from 7th International Scientific and Practical Conference on Human Resource Management (ICHRM).* University of Economics-Varna, pp. 214 – 218. DOI: 10.56065/HRM/2026.214

## Introduction

Two prominent theories provide insight into women's leadership experiences. **Role Congruity Theory** argues that women leaders are often evaluated through the lens of gendered expectations, creating prejudice when leader behaviors appear incongruent with communal norms (Eagly & Karau, 2002). Specifically, leadership roles are historically coded as agentic, emphasizing control, assertiveness, and authority, while women are socially expected to embody communal qualities such as warmth, empathy, and supportiveness. When women display agentic behaviors, they risk backlash; when they emphasize communal traits, they may be judged as insufficiently authoritative.

Complementing this perspective, **the Labyrinth model** reconceptualizes the barriers to women's leadership advancement (Eagly & Carli, 2007). Unlike the "glass ceiling," which suggests a single, impenetrable barrier, the labyrinth metaphor highlights a complex path shaped by structural inequities, cultural norms, and organizational practices. Women can and do achieve leadership success, but only by navigating detours and biases. Within schools, these challenges manifest in gendered expectations of principals and teachers' attitudes toward female authority.

## Leadership styles, gender, and perceptions

Research consistently shows that leadership style strongly conditions how women leaders are evaluated. Early meta-analyses found few substantive sex differences in actual leadership behavior, but systematic differences in perceptions (Eagly & Johnson, 1990). Women are often expected to lead in more participatory, collaborative, and supportive ways (Grogan & Shakeshaft, 2011). When their behaviors align with these expectations — such as through transformational or instructional leadership emphasizing vision, collaboration, and individualized support — evaluations tend to be positive (Shakeshaft et al., 2007).

Conversely, women who employ directive, corrective, or interventionist strategies may encounter resistance. These approaches, more closely associated with stereotypically masculine or agentic behaviors, can produce dissonance under Role Congruity Theory, leading teachers to interpret them as excessive or punitive. However, the outcomes of such styles depend heavily on school climate and the broader cultural setting.

**School climate and teacher self-efficacy as moderators**

**School climate** — the collective sense of trust, collegiality, and safety — powerfully moderates leadership effects. In positive climates, teachers tend to interpret task-oriented or corrective actions as supportive of learning and accountability. In negative climates, the same actions may be viewed as controlling or adversarial (Hoy et al., 1991). Thus, school climate can both mediate (leadership → climate → teacher attitudes) and moderate (climate shaping the strength of leadership effects) the relationship between leadership and teacher outcomes.

Teacher **self-efficacy**, grounded in Bandura's social-cognitive theory, is also central. Teachers with higher self-efficacy interpret leadership as empowering and are more receptive to change initiatives (Tschannen-Moran & Hoy, 2001). Lower efficacy, by contrast, increases vulnerability to perceiving leadership as threatening or misaligned with professional autonomy.

**Women's leadership in educational contexts**

Schools provide a distinctive arena for examining women's leadership. The teaching profession is female-dominated, yet school leadership, especially in secondary settings, has historically been male-led (Shakeshaft et al., 2007). Women principals often leverage relational, communal, and instructional leadership practices, aligning well with the demands of education and with communal role expectations (Grogan & Shakeshaft, 2011). Evidence shows that such practices foster stronger teacher collaboration, professional development, and commitment (Hallinger, 2011).

Nevertheless, context matters. In culturally traditional or minority communities, gender norms can intensify scrutiny of female leaders (Shapira & Addi-Raccah, 2019). Women may face skepticism when asserting authority but can gain strong acceptance when demonstrating competence, fairness, and care for teachers and students. These findings resonate with both the Labyrinth model, which highlights the contextual detours women must navigate, and Role Congruity Theory, which explains why congruence between leadership behaviors and gendered expectations produces more favorable outcomes.

**Empirical support from Arab schools**

Empirical work in Arab schools illustrates these dynamics vividly. Teachers tend to hold **positive attitudes toward female principals** when they exhibit **task-oriented, supportive, and expectation-focused leadership styles**, but negative attitudes toward **corrective or interventionist styles**. School climate consistently emerges as the strongest predictor of attitudes, underscoring its central role as mediator and moderator. Teacher self-efficacy also contributes significantly, suggesting that empowered teachers are more receptive to female leadership. These results align with theoretical predictions: communal and supportive leadership is judged congruent with gender expectations, while agentic corrective behaviors are more vulnerable to negative perceptions unless buffered by trustful climates.

**Hypotheses**

Based on this literature, the following hypotheses are proposed:

- **H1:** Teachers' attitudes toward female principals will be positively associated with task-oriented, supportive, and expectation-focused leadership styles.
- **H2:** Teachers' attitudes toward female principals will be negatively associated with corrective and interventionist leadership styles.
- **H3:** School climate will mediate the relationship between leadership style and teacher attitudes, such that positive climates amplify supportive and task-oriented leadership while buffering against negative perceptions of corrective leadership.

- **H4:** Teacher self-efficacy will positively predict attitudes toward female principals, with higher self-efficacy associated with more favorable perceptions of leadership.
- **H5:** In line with Role Congruity Theory, leadership behaviors that align with communal expectations (supportive, relational) will be perceived more positively in female principals than behaviors emphasizing control or correction.

## Methodology

The study included 151 teachers from elementary, middle, and high schools in the Arab sector of Israel. Participants were recruited through school principals, who received a detailed explanation of the study's objectives via phone. The questionnaire was distributed electronically using Google Forms.

The sample comprised 82.8% female teachers, aged 27 to 63, with teaching experience ranging from 2 to 40 years. Educational qualifications varied from bachelor's to doctoral degrees. This diversity ensured a broad representation of teaching staff, enhancing the ecological validity of the findings.

The questionnaire assessed multiple constructs:

**1. Attitudes toward female leadership**

**2. Educational leadership styles**, including supportive, task-oriented, recognition-based, reward-based, corrective, expectation-oriented, and intervention-oriented styles

**3. Teaching self-efficacy**

**4. Perceptions of school social protection climate**

All measures were adapted from validated instruments in previous studies to ensure reliability and construct validity.

After obtaining informed consent, participants completed the online questionnaire. Data collection was anonymous and voluntary. Ethical approval was obtained from the relevant institutional review board, ensuring compliance with research ethics standards.

## Data Analysis

Data were analyzed using descriptive statistics, Pearson correlations, and multiple regression analyses. Descriptive statistics summarized general tendencies in attitudes and perceptions. Correlational analyses examined relationships between leadership attitudes, leadership styles, teaching self-efficacy, and school climate. Multiple regression analyses identified predictors of attitudes toward female principals, with hierarchical regression assessing the relative contributions of psychological and contextual factors.

## Results

### Descriptive Statistics

Teachers reported generally positive attitudes toward female leadership ($M = 4.34$, $SD = 0.65$), indicating a favorable perception of female principals' roles. Ratings of teaching self-efficacy ($M = 3.81$, $SD = 0.51$) and school social protection climate ($M = 3.87$, $SD = 0.54$) were moderately high, suggesting that teachers feel competent and supported in their school environments.

Leadership style assessments revealed task-oriented, supportive, and expectation-oriented approaches as predominant. This aligns with prior research suggesting that effective principals balance structured management with relational leadership (Leithwood & Jantzi, 2005). Intervention-oriented leadership was least endorsed, reflecting a general preference against authoritarian or intrusive leadership behaviors.

### Correlational Analysis

Pearson correlation analyses indicated significant positive relationships between attitudes toward female leadership and supportive, task-oriented, reward-based, recognition-based, and expectation-oriented leadership styles. This demonstrates that teachers value guidance, motivation, and clear expectations (Bass & Avolio, 1994). Negative correlations with intervention-oriented and corrective leadership suggest resistance

to perceived controlling or punitive behaviors.

Teaching self-efficacy was positively associated with favorable attitudes toward female leadership, consistent with Bandura's (1997) theory that empowered teachers are more likely to perceive leadership positively. Similarly, school social protection climate showed a strong positive correlation with leadership attitudes, highlighting the importance of a nurturing and inclusive school environment in shaping perceptions (Thapa et al., 2013).

### Regression Analyses

Multiple regression analyses revealed that task-oriented leadership significantly predicted positive attitudes toward female principals, while corrective and intervention-oriented styles negatively predicted them. These findings align with transformational leadership theory, which posits that structured yet supportive leadership enhances follower satisfaction (Northouse, 2018).

Teaching self-efficacy and school social protection climate independently explained significant portions of variance in attitudes. Hierarchical regression indicated that school climate was the strongest predictor when all variables were considered, emphasizing the critical role of contextual factors in shaping teachers' perceptions of female leadership (Hoy & Tarter, 1997).

## Discussion

The findings indicate that teachers in the Arab sector of Israel generally hold positive attitudes toward female leadership. High ratings for teaching self-efficacy and school social protection climate suggest that teachers feel competent and supported, fostering favorable perceptions of principals.

### Leadership Styles and Attitudes

Task-oriented, supportive, and expectation-oriented leadership styles were most prevalent, consistent with literature indicating that effective principals combine structured management with relational approaches (Leithwood & Jantzi, 2005). Conversely, intervention-oriented leadership was least favored, reflecting a preference against authoritarian leadership. Positive correlations between attitudes toward female leadership and supportive, task-oriented, reward-based, recognition-based, and expectation-oriented styles emphasize the value teachers place on guidance, motivation, and clear expectations (Bass & Avolio, 1994). Negative correlations with corrective and intervention-oriented styles further reinforce this preference against controlling leadership.

### Teaching Self-Efficacy and School Climate

The positive association between teaching self-efficacy and favorable attitudes toward female leadership aligns with Bandura's (1997) theory that empowered teachers perceive leadership more positively. Likewise, the strong link between school social protection climate and leadership attitudes highlights the role of a nurturing and inclusive environment in shaping teacher perceptions (Thapa et al., 2013).

### Predictors of Attitudes

Regression analyses revealed that task-oriented leadership significantly predicted positive attitudes, whereas corrective and intervention-oriented leadership negatively predicted them, supporting the transformational leadership framework (Northouse, 2018). Teaching self-efficacy and school social protection climate also significantly predicted attitudes, with school climate emerging as the strongest predictor, emphasizing the contextual factors' paramount influence on leadership perceptions (Hoy & Tarter, 1997).

### Implications

These results underscore the importance of promoting supportive, structured leadership styles and fostering positive school climates to enhance acceptance of female principals. Developing teachers' self-efficacy and maintaining an inclusive school environment may further strengthen leadership perceptions and overall school functioning.

### Limitations and Future Research

The study's limitations include reliance on self-reported measures and a cross-sectional design, which limits causal inferences. Future research could adopt longitudinal or experimental designs to examine causal relationships and expand sampling to additional regions and educational contexts to increase generalizability.

### Conclusion

This study contributes to the limited literature on female leadership in minority educational settings by highlighting the complex interplay between leadership style, school climate, teacher efficacy, and gendered perceptions. The results advocate for policies and professional development programs that promote supportive and task-oriented leadership while fostering positive school climates to enhance acceptance of female principals.

Future research should explore longitudinal effects of female leadership on school outcomes and examine qualitative perspectives to deepen understanding of the cultural nuances affecting leadership perceptions in Arab society.

### References

1. Bandura, A. (1997). Self-efficacy: The exercise of control. W. H. Freeman.
2. Bass, B. M., & Avolio, B. J. (1994). Improving organizational effectiveness through transformational leadership. Sage Publications.
3. Bryk, A. S., & Schneider, B. (2002). Trust in schools: A core resource for improvement. Russell Sage Foundation.
4. Eagly, A. H., & Carli, L. L. (2007). Through the labyrinth: The truth about how women become leaders. Harvard Business School Press.
5. Eagly, A. H., & Johnson, B. T. (1990). Gender and leadership style: A meta-analysis. Psychological Bulletin, 108(2), 233–256.
6. Grogan, M., & Shakeshaft, C. (2011). Women and educational leadership. Jossey-Bass.
7. Hoy, W. K., & Tarter, C. J. (1997). The road to open and healthy schools: A handbook for change. Corwin Press.
8. Leithwood, K., & Jantzi, D. (2005). Transformational leadership. In B. Davies (Ed.), The essentials of school leadership (pp. 31–43). SAGE Publications.
9. Northouse, P. G. (2018). Leadership: Theory and practice. Sage Publications.
10. Shapira, M., et al. (2012). [Hebrew source on women leadership in Arab society].
11. Shlesky, L., & Ariely, G. (2016). Identity and power in education. Routledge.
12. Stryker, S., & Burke, P. J. (2000). The past, present, and future of an identity theory. Social Psychology Quarterly, 63(4), 284–297.
13. Thapa, A., Cohen, J., Guffey, S., & Higgins-D'Alessandro, A. (2013). A review of school climate research. Review of Educational Research, 83(3), 357–385.
14. Valentine, J. W., & Prater, D. L. (2011). Gender and educational leadership. Journal of Educational Administration, 49(3), 261–274.
15. Yoeli, M., & Berkovich, I. (2010). Principals' gender and school leadership. Educational Management Administration & Leadership, 38(3), 334–355.

ISSN (Online): 2815-5084

INTERNATIONAL SCIENTIFIC AND PRACTICAL CONFERENCE ON HUMAN RESOURCE MANAGEMENT
DOI: 10.56065/HRM/2026.219, pp. 219 – 224

7th edition, 3 October 2025
University of Economics-Varna

# Professional Competence of Real Estate Brokers: A Key Determinant of Service Quality

**Yavor NIKOLOV** [1]

[1]Department "Business, Investment, Real Estate", University of Economics – Varna, Varna, Bulgaria, yavor_nikolov@ue-varna.bg

**JEL: J24, L85, R30**

**Abstract**

This report examines the role of professional competence as a key factor in assessing the quality of real estate agency servicesary services in real estate agencies (REAs) in Bulgaria. The study is based on an empirical survey among 123 real estate agency clients conducted in the period 2024–2026, through a standardized online survey.

The findings indicate that professional competence emerged as the weakest dimension of perceived service quality in the model of the perceived service quality. Four of the five lowest rated indicators relate to this dimension. The most serious deficit is observed in the role of the broker as a professional advisor – providing information about opportunities, alternatives and risks in transactions.

The analysis is complemented by an international comparative overview of regulatory models and qualification requirements in selected countries of the European Union and other developed markets. Based on the results, recommendations have been formulated to increase professional competence through the introduction of a minimum educational qualification, continuing professional training and management mechanisms at the company level.

**Published by University of Economics – Varna**

**Key words:**
professional competence, service quality, real estate agencies, brokerage, educational qualification.

*Citation:* Nikolov, Y. (2026). Professional Competence of Real Estate Brokers: A Key Determinant of Service Quality. *Proceedings from 7th International Scientific and Practical Conference on Human Resource Management (ICHRM).* University of Economics-Varna, pp. 219 – 224. DOI: 10.56065/HRM/2026.219

## Introduction

The residential real estate market in Bulgaria is going through a period of unprecedented dynamics – the cumulative price growth of 156% for the period 2015 – 2025 ranks the country third in the European Union, and the volume of mortgage loans has increased sevenfold. These dynamics significantly increase the financial stake in any transaction and requires real estate agency servicesaries to have in-depth legal, financial and market knowledge that goes far beyond the traditional understanding of brokerage. At the same time, Bulgaria remains one of the few European countries without a specialized law regulating real estate real estate agency servicesation. Access to the profession is not tied to formal qualification requirements, licensing, or mandatory registration. This creates conditions for the entry of incompetent actors, the spread of unfair practices and the loss of trust in the entire sector.

The aim of this report is to substantiate the role of professional competence as a key factor in the assessments of the quality of services in real estate agencies, using empirical data from an author's study, a theoretical analysis of the relationship between education and quality and an international comparative review. Professional competence is not limited to the accumulation of knowledge, but also includes practical skills and ethical attitudes – aspects that are difficult to form outside a systematized educational environment.

## 1. Main Problems and Deficits in the Quality of Real estate agency servicesary Services in Real Estate Agencies in Bulgaria

The quality of real estate agency servicesary services is a key factor in limiting information asymmetry, managing risk and creating value for the client. Modern research shows that the high quality of real estate agency servicesary services increases market transparency, facilitates the decision-making process and contributes to reducing the risk of real estate transactions. However, the practice on the Bulgarian market reveals a number of structural, institutional and professional deficits that limit the quality of the services provided. It is these deficits that form the need to develop and empirically validate an adapted model for assessing the quality of real estate agency servicesary services in real estate agencies (REAs).

The presence of these deficits finds its theoretical explanation in the Theory of Agency Relations **(**Jensen & Meckling**,** 1976**),** the application of which in modern real estate market research continues to be confirmed. The information asymmetry between the broker and the client creates prerequisites for conflict of interest, moral hazard and deviation from the optimal result for the client. transparency and professional accountability further increase the likelihood that these risks will manifest themselves in practice **(**Baldwin et al., 2012**;** CEPI, 2022).

One of the main structural factors that determine these deficits is the **lack of a special law** regulating the real estate agency servicesary activity with real estate in Bulgaria. Although the profession of "real estate broker" is included in the National Classification of Professions and Positions, and the activity is carried out under the general procedure of the Commerce Act, there are no statutory minimum requirements for education, professional qualifications, ethical standards and control mechanisms. Unlike most European countries, where access to the profession is subject to qualification and regulatory requirements, in Bulgaria the lack of such a regime creates prerequisites for entry of participants without the necessary professional training and makes it difficult to ensure the quality of real estate agency servicesary services (CEPI, 2022; FNAIM, 2024)**.**

In recent years, bills have been submitted to the National Assembly several times to regulate real estate agency servicesary services in real estate transactions. They provide for the introduction of a public register of real estate agency servicesaries, requirements for professional qualification and continuing education, as well as compulsory professional liability insurance. However, the legislative initiatives have not been implemented due to disagreements over the proportionality of the proposed measures, the possible restriction of competition and concerns about excessive concentration of regulatory functions.

From the point of view of quality of services, the lack of a uniform regulatory framework leads to the absence of minimum standards for real estate agency servicesary activities, uneven practices in determining remuneration, insufficient protection of consumers in the event of conflicts of interest and lack of uniform ethical and disciplinary mechanisms. As a result, the quality of services depends primarily on the internal rules and corporate culture of individual agencies, rather than on generally valid professional standards.

Another factor that hinders the provision of quality real estate agency servicesary services is the high degree **of information asymmetry in the market**. Limited access to reliable information on completed transactions, incompleteness of public data and the lack of mandatory registration of pre-sale contracts and leases hinder the formation of a transparent and objective market environment (European Commission, 2023). Information asymmetry has a direct impact on the quality of real estate agency servicesary services, as limited access to reliable market information makes it difficult to form objective market assessments, creates prerequisites for subjective expectations and increases clients' dependence on the professional competence of the real estate agency servicesary (European Commission, 2023). In these conditions, brokers often have an informational advantage over the parties to the transaction, which can be used both to provide expert advice and to manipulate expectations or implement unfair practices. Trust and transparency are therefore becoming key dimensions of perceived quality and imply clear professional standards and effective regulation (CEPI, 2022; European Commission, 2023)**.**

Despite the introduction of a state educational standard for the profession of "Broker" and the development of vocational training programs, there are still no uniform requirements for continuing

professional development, and the level of legal, financial, valuation and digital competence remains heterogeneous. provide a comprehensive advisory service and lead to significant differences in the quality of service between different agencies (CEPI, 2022; RICS, 2023).

International empirical research shows that professional training, ethical behavior and effective regulation are among the main factors determining the perceived quality of real estate agency servicesary services (RICS, 2023; CEPI, 2022; FNAIM, 2024). This confirms the importance of systematic training, continuing professional development and clear professional standards in Bulgarian conditions as well.

According to modern research on the quality of services, reliability, responsiveness, confidence, empathy and transparency continue to be the main dimensions of the perceived quality, with the classic SERVQUAL and Grönroos models retaining their theoretical relevance and finding application in various areas of services. In real estate brokerage, these dimensions are manifested through the ability of the broker to understand the client's needs, provide timely and transparent communication, fulfil commitments and provide personalized advice (RICS, 2023; FNAIM, 2024). However, the practice on the Bulgarian market shows deviations from these principles, expressed in standardized service, incomplete feedback, insufficient transparency in recommendations to the client and lack of systematic follow-up of satisfaction after the completion of the transaction. These deficits limit the perceived quality of service and make it difficult to build long-term trust between the broker and the client (CEPI, 2024; RICS, 2023).

Some international empirical research shows that consumers rate the quality of real estate agency servicesary services as average and highlight the need for improvement, especially in terms of reputation, communication, transparency and compliance with professional standards (FNAIM, 2024; European Commission, 2023). This shows that the challenges related to the quality of services are not specific only to the Bulgarian market, but are exacerbated in our country by regulatory and institutional deficits (CEPI, 2022). The lack of effective mechanisms for professional control and disciplinary liability makes it difficult to limit such practices and has a negative impact on the perceived fairness, security and reliability of real estate agency servicesary services – key prerequisites for building trust between the broker and the client.

Digitalization and the development of online platforms are significantly changing the way consumers search for information and evaluate the quality of real estate agency servicesary services. Along with easier access to offers and more effective communication, the digital environment also creates new risks related to the publication of misleading ads, the manipulation of online reputation through unreliable reviews and the inadequate use of CRM systems, which often function only as a database, and not as a tool for managing customer relationships (Ferreira et al., 2023). In the absence of reliable mechanisms for verifying professional conduct, online reputation can become a source of additional information asymmetry rather than an objective indicator of the quality of real estate agency servicesary services (European Commission, 2023).

The considered deficits are also aggravated by the lack of a systematic approach to quality management in real estate agencies. Although some of the larger companies apply internal procedures, trainings and standardized practices, implemented quality management systems, regular process audits, standardized tools for measuring customer satisfaction and formalized models for evaluating the performance of brokers are still rare in the sector (ISO 9001:2015, 2024; RICS, 2023). This makes quality highly dependent on the individual competencies of the individual broker, rather than on sustainable organizational processes. Systematic quality measurement and management is a key factor in achieving a sustainable competitive advantage, increasing customer satisfaction and building long-term relationships. makes it difficult to replicate good practices and limits the possibilities for objective comparison between agencies.

An additional problem is the limited application of professional standards in practice. In Bulgaria, BDS EN 15733 "Services of real estate brokers. Requirements for the provision of services by real estate brokers", which sets out basic requirements for professional competence, transparency of services, client information and conflict of interest management. However, its practical application remains limited and is often confined to a formal reference, without a real implementation of the envisaged procedures and control mechanisms. An additional obstacle is the low awareness of consumers about the existence and importance of the standard, as well as the limited possibilities for effective control of its compliance. This discrepancy leads to a lack of trust in institutions and hinders the promotion of quality as a strategic priority in the activities of real estate agencies.

The analysis shows that the main deficits in the quality of real estate agency servicesary services can be divided into five interrelated groups: **regulatory**, **institutional**, **professional**, **organizational** and **ethical**. Their manifestation is expressed in insufficient regulatory framework, limited institutional control, uneven professional training, lack of quality management systems and practices that undermine consumer confidence.

The interconnectedness of these deficits shows that quality improvement cannot be achieved through isolated measures, but requires an integrated approach combining an adequate regulatory framework, professional standards and continuing training, effective in-house quality management systems and mechanisms for self-regulation and public control.

## 2. Empirical verification of the study

The empirical verification was conducted through a standardized online survey (Google Forms) among 123 real estate clients in Bulgaria, in the period 2024 – 2026**.**

The lowest rated by the survey is the indicator – "information about options and risks", which shows that clients expect a more active **advisory role** from brokers, and not just an real estate agency servicesary function. The strengths of the agencies, according to the respondents, – "meeting deadlines" and friendly attitude – show that the basic elements of the service have been mastered, but **the expert advisory function remains a critical deficit**.

The analysis confirms that professional competence has a **statistically significant positive impact** on the perceived quality, and through it the satisfaction with the services offered by the ANI is explained.

The survey reveals a clear client's attitude towards professionalization. Over **70%** of consumers support the introduction of compulsory education and training. The most frequently cited critical expectations for the broker are: knowledge and expertise, communication, professional training, ethical behavior.

These results can be interpreted as an indicator of **the social legitimacy** of the professionalization measures: the client is not only looking for a quick implementation of the transaction, but for security, predictability and correct consultation.

This comparison highlights Bulgaria's deficit position – the only one of the analyzed countries without any of the four elements (education, continuing vocational training, registration, supervision). The legislative initiatives from 2022 to 2025 show a growing public and political need for regulation, with each subsequent bill building on the previous one with more precise definitions and an expanded scope of educational requirements.

The lack of competency requirements is manifested in specific unfair practices identified in the study: (1) hidden fees and commissions; (2) false listings; (3) conflict of interest; (4) double representation; (5) lack of a written contract; (6) pressure for a quick decision.

These findings find a theoretical explanation in Akerlof's (1970) Market Theory and Jensen and Meckling's (1976) Agency Relations Theory, which summarize that in the absence of quality signaling mechanisms, the market is naturally filled with low-quality participants that crowd out qualitative ones. Regulation in this context is not an administrative burden, but an economic tool to level the playing field (Baldwin, Cave, & Lodge, 2012).

Based on the analysis, recommendations can be formulated at three levels:

**1. Macro level (regulatory framework).** Adoption of a specialized Law on Real estate agency servicesary Services in Real Estate Transactions, including: a balanced access regime with a minimum educational qualification; a national public register; compulsory professional insurance; implementation of the European standard BDS EN 15733:2010 as a minimum requirement for competence, ethical behavior and procedures for working with clients (CEN, 2010).

**2. Meso level (industrial and educational environment).** Introduction of continuing professional training (CPD) with a recommended range of 40 – 60 hours over a three-year period, including modules on: legal and regulatory changes; standards for announcements and viewings; ethics and conflict of interest; valuation approaches and market analysis; digital tools (CRM, MLS). Development of specialized educational programs in the field of real estate at higher education institutions.

**3. Micro level (company management).** Five key management areas: defining a broker's competence profile with three categories – basic knowledge, process skills and behavioral competencies; introductory and continuing training; standard operating procedures (SOPs) for the critical stages of the transaction; code of ethics with discipline mechanisms; systematic quality measurement.

The analysis unequivocally positions the professional competence of the broker as a **key factor** in the quality assessments of real estate agency servicesary services.

Educational qualifications are **a necessary but not sufficient condition** for achieving high quality – their effect is manifested to the greatest extent when they are integrated with public traceability mechanisms, systems for continuing professional training and management decisions at the company level. The synergy between a regulatory framework, high educational standards and innovative company management is a prerequisite for sustainable development of the sector and the establishment of the brokerage profession as a qualified and ethical consulting activity.

## Conclusion

The conducted research shows that professional competence is becoming a key factor for the quality and sustainable development of the real estate real estate agency servicesation services market in Bulgaria. In a dynamic market, rising housing prices, and increasing financial complexity of transactions, the broker's role goes beyond traditional brokerage and requires expertise, practical skills, and high ethical standards.

Empirical analysis confirms that competence is the area in which clients identify the most significant deficits. Users expect from professionals not only the correct execution of administrative actions, but also an active consulting role related to the provision of information, risk assessment and support for informed decision-making. The results prove the existence of a direct positive relationship between professional competence, perceived quality of service and customer satisfaction. At the same time, the high support among consumers for the introduction of requirements for education and vocational training shows a public need to raise standards in the sector.

In this sense, the professionalization of real estate real estate agency servicesation should be seen not only as a regulatory necessity, but as a prerequisite for building confidence, consumer protection and sustainable market development. The introduction of clear standards for competence and professional training would contribute to improving the quality of services and establishing the broker as an expert professional advisor in the process of real estate transactions.

## References

1. Akerlof, G. A. (1970). The market for lemons: Quality uncertainty and the market mechanism. *The Quarterly Journal of Economics, 84*(3), 488–500.

2. Alibasic, A., & Čavrak, V. (2022). Human capital as a driver of real estate service quality. *Journal of Service Science Research, 14*(2), 123–143.

3. Baldwin, R., Cave, M., & Lodge, M. (2012). *Understanding regulation: Theory, strategy, and practice* (2nd ed.). Oxford University Press.

4. Baldwin, R., Cave, M., & Lodge, M. (2012). *Understanding regulation: Theory, strategy, and practice* (2nd ed.). Oxford University Press.

5. CEPI — European Association of Real Estate Professions. (2022). *Regulatory framework and professional qualifications in the EU real estate sector*. https://cepi.eu

6. Chambre Immobilière – FNAIM. (2024). *La profession d'agent immobilier en France: Cadre juridique et obligations de formation continue*. https://www.fnaim.fr

7. European Commission. (2023). *European housing market developments*. Publications Office of the European Union.

8. Ferreira, M. S., Antão, J., Pereira, R., Bianchi, I. S., Tovma, N., & Shurenov, N. (2023). *Improving real estate CRM user experience and satisfaction: A user-centered design approach*. Journal of Open Innovation: Technology, Market, and Complexity, 9(2), 100076. https://doi.org/10.1016/j.joitmc.2023.100076

9. https://www.iso.org/standard/88431.html

10. Jensen, M. C., & Meckling, W. H. (1976). Theory of the firm: Managerial behavior, agency costs and ownership structure. *Journal of Financial Economics, 3*(4), 305–360.

11. Royal Institution of Chartered Surveyors. (2022). *Rules of Conduct*. RICS.

12. Royal Institution of Chartered Surveyors. (2024). *Property agency and management principles (1st ed.)*. RICS.

Conference Proceedings

# HUMAN RESOURCE MANAGEMENT

**International Scientific-Practical Conference**

**Organized by the University of Economics – Varna**

**03 October 2025**

Предпечатна подготовка *Дора Томова*

Издателство „Наука и икономика“
Икономически университет – Варна
ул. „Евлоги Георгиев“ 24

Science and Economics Publishing House
University of Economics – Varna

ISSN (Online) 2815-5084
DOI: 10.56065/HRM/2026

