

Organizational, Technological and Economic Facets of AI Implementation in HRM Trainings

Wiesława Gryncewicz, Agnieszka Pilch and Ryszard Zygała

Wroclaw University of Economics and Business, Komandorska 118/120, 53-345, Wroclaw, Poland

Abstract

The use of Artificial Intelligence (AI) in the area of Human Resource Management (HRM) training can significantly improve the effectiveness and efficiency of training programs while providing employees with a more engaging and personalized learning experience. The thoughtful use of artificial intelligence in employee training can have a positive impact on increasing the availability of training services and resources, shortening training cycles from the occurrence of a need to its satisfaction, as well as adjusting the economics of training processes in various dimensions. The organizational, technological and economic effects of implementing artificial intelligence in HRM training were highlighted and discussed in the paper.

Keywords ¹

HRM, AI impact, artificial intelligence

1. Introduction

The influence of modern information and communication technologies is present in all areas of human life and work. These technologies have revolutionized the way we communicate, work, learn, and even play. In terms of work, especially artificial intelligence has transformed the way people work and interact with each other. According to IDC's Future of Work 2022 research [1], this year, 60 percent of global 2000 businesses will deploy AI and machine learning (ML) tools to support the entire employee life cycle experience. By 2024, the authors predict, 80 percent of the global 2000 organizations will use AI/ML-enabled "managers" to hire, fire and train employees.

In the area of HRM, the impact of AI has been identified in different activities, namely, recruiting, training, and work performance [2]. In our study, we have focused on the use of AI in HRM training. This field has significant potential because AI can help organizations to create more efficient, effective, and personalized learning experiences for employees, while also improving the overall performance and productivity of the organization, which is ultimately crucial. The implementation of AI in HRM trainings is expected to grow in the coming years. The generative AI in HR market size was valued at USD 483.59 million in 2022 and it is expected to hit around USD 2091.4 million by 2032 [3].

AI can provide personalized and adaptive learning experiences that are tailored to each individual employee's needs and learning style. AI can help HR managers to identify skill gaps and training needs within the organization more accurately. AI can analyze employee data to identify patterns and trends, and then provide recommendations for training and development programs that can address these needs [4]. AI can enable HR managers to deliver training content more efficiently and effectively. AI-powered chatbots and virtual assistants can provide on-demand training support to employees, reducing the need for HR staff to answer questions or provide guidance [5]. This can save time and resources while still providing high-quality training experiences. Finally, AI can help HR managers to measure the effectiveness of training programs and assess their impact on employee performance. AI can track metrics such as employee engagement, productivity, and job satisfaction, and provide insights into the

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EMAIL: wieslawa.gryncewicz@ue.wroc.pl; agnieszka.pilch@ue.wroc.pl; ryszard.zygala@ue.wroc.pl

ORCID: 0000-0003-1208-4099; 0000-0002-4595-1999; 0000-0003-2690-8271



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effectiveness of different training approaches. The implementation of artificial intelligence into a company's business processes is significant, as the use of AI in an organization will make training processes more effective, as well as increase and improve the performance of employees at various levels in developing the competencies that the organization requires. Identifying skill gaps is a critical step in the training process and allows HR managers to have a comprehensive understanding of employee development needs.

The main purpose of the paper is to analyze the organizational, technological and economic facets that occur in HRM training. These aspects were explored at an operational level and detected elements such as: time flexibility, more customized learning, ability to find tailored training programs, reduction in technological and social exclusions and economics impacts.

The paper is structured as follows. AI capabilities are presented in section II and then the research method is described in the next section. The aforementioned influences were classified as organizational, technical, and economic. Sections IV and V discussed them. We conclude our paper by pointing out some ideas for future work.

2. AI capabilities in HRM

AI in HRM training has the potential to revolutionize how organizations train and develop their employees. It enables a more personalized, efficient, and data-driven approach to employee development, leading to improved skills, performance, and retention within the workforce. Current research focuses on the development of artificial intelligence models in the context of HRM training. A variety of methods are used for this such as: Decision Trees, Neural Language Processing and the K-Nearest Neighbors Method [2]. These methods aim to develop data analysis techniques that enable automatic information processing, pattern identification and prediction. Personalization and employee evaluation are also features of AI in HRM training. AI models, for example, are being built to determine whether employees should undergo particular training or be eligible for advancement. Based on data regarding a person's training history, talents, and performance, these models may assess and recommend appropriate growth paths for that employee. Table 1 provides a more detailed explanation of how AI is employed in HRM training.

Table 1
AI in HRM training

HRM training tasks	Description
Personalized Learning and Development	AI-powered systems can analyze employee data, such as performance reviews, skills assessments, and career aspirations, to recommend personalized training and development programs. This helps in creating tailored learning paths that are more effective for individual employees.
Skill Gap Analysis	AI can assess the skills of the workforce and identify skill gaps. This information can be used to develop training programs that address specific deficiencies, improving overall competence within the organization.
Content Curation	AI can curate and recommend relevant learning content for employees. By analyzing an individual's learning history, preferences, and the company's training goals, AI systems can suggest courses, articles, videos, or other resources that are most likely to benefit the employee.
Chatbots for Learning Support	Chatbots powered by AI can provide on-demand assistance to employees with questions about training materials, schedules, or learning objectives. They can also facilitate peer-to-peer learning by connecting employees with similar learning interests.
Predictive Analytics	HRM can use AI to predict which employees are most likely to benefit from specific training programs or are at risk of falling behind. This helps in allocating training resources more efficiently.
Training Assessment and Feedback	AI-driven tools can automatically assess the effectiveness of training programs by analyzing employee performance before and after training. They can provide feedback and recommendations for improvement.

Automated Course Design	AI can assist in the design of training courses by generating content outlines, suggesting teaching methodologies, and even creating course materials. This can save time and resources in course development.
Language and Communication Skills Enhancement	AI-powered language models can assist in enhancing communication skills by providing real-time feedback on written and spoken communication. They can highlight areas for improvement and suggest corrections.
Virtual Reality (VR) and Augmented Reality (AR) Training	AI can be integrated into VR and AR training simulations to provide realistic scenarios and personalized learning experiences. This is particularly valuable for industries where hands-on training is essential.
Training Evaluation and ROI Analysis	AI can help HR departments evaluate the return on investment (ROI) of training initiatives by analyzing performance metrics, employee engagement, and other relevant data.
Continuous Learning	AI can enable continuous learning by facilitating micro-learning, which delivers small, digestible pieces of information at regular intervals. This keeps employees engaged and consistently developing their skills.
Monitoring and Compliance Training	AI can help in monitoring and ensuring compliance with regulatory requirements by tracking and recording employee participation and progress in compliance training programs.
Predicting Employee Attrition	AI can analyze various data points to predict which employees are at risk of leaving the organization. This information can be used to provide targeted training and development opportunities to retain valuable talent.
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The preceding table does not exhaust the possibilities for using AI in HRM training. In accordance with the research purpose, the remainder of the paper will concentrate on organizational, technological, and economic aspects of the research area. The following section will go over the research method that was used.

3. Research method

The authors accomplished a literature research to discover the specifics of the usage of AI in HRM training. The Scopus database was the study's initial focus. A keyword search yielded 29 results. After reviewing the titles and abstracts, 13 articles remained, but 7 were eliminated during the content review. The collection was expanded in the second phase of the research by an additional 15 papers from various sources (ResearchGate, Semantic Scholar, OECD Library, EmeraldInsight, and Google Scholar); duplicate articles were of course omitted. Finally, 21 articles addressing various areas of HRM training support using AI technologies and techniques were chosen for further research. The authors of the publications under consideration made reference to the six key areas listed below:

- time flexibility
- customized trainings
- ability to find tailored training programs
- reduction of exclusions
- reduction of social exclusions
- economics impacts.

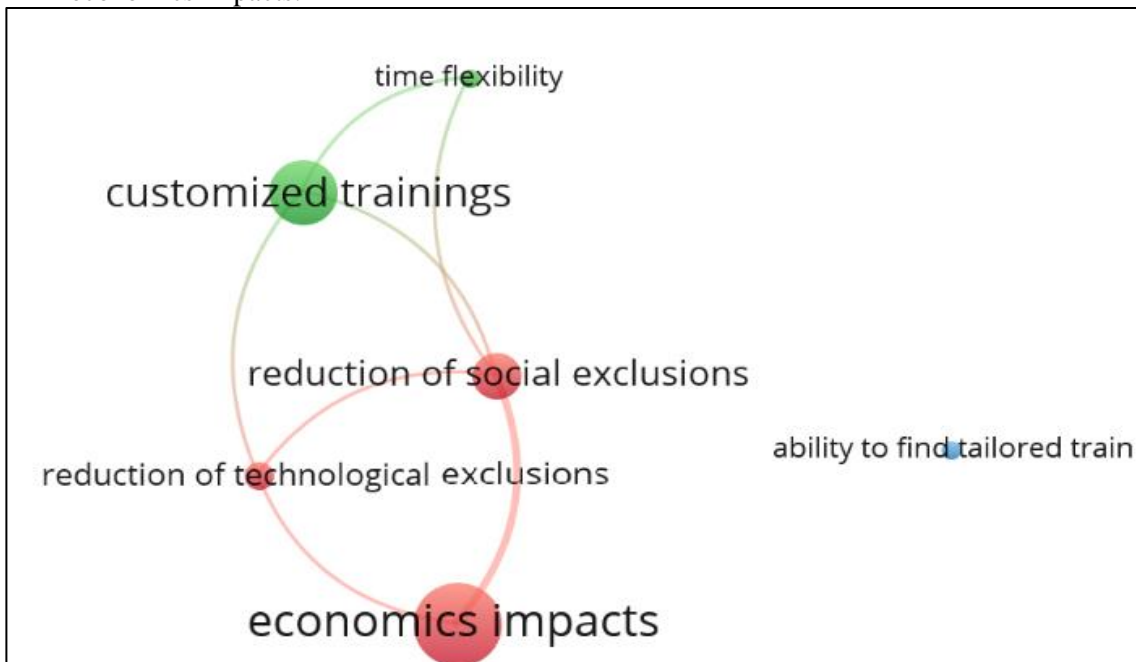


Figure 1: Key areas of AI impacts in HRM trainings

Utilizing VosViewer, the distribution of significant areas in the examined scientific papers is depicted in the Fig. 1.

Given the scale of interest of the authors of the studies analyzed, the economic element was included as a separate one, while the others were classified as organizational and technological. These will be discussed in the following sections.

4. Organizational and technological impact of AI in HRM training

AI has the capability to revolutionize training in HRM by automating and optimizing many of the processes involved in employee training and development. In this section, we highlight some of the organizational and technological impacts of AI on HRM training, and specifically discuss flexibility, personalization, the ability to find customized training programs, and address issues related to reducing technological and social exclusion.

4.1. Time flexibility

Artificial Intelligence and MOOC (Massive Open Online Course) allow access to courses and trainings anywhere and anytime tailored to the needs of the employee. According to [6] LMS (Learning Management Systems) allow to break the space-time connection in the student-teacher relationship, because they can cooperate with each other regardless of time zone and geographical location. This approach allows for a significant shortening of the learning process and increasing the effectiveness of employees, because the student has the opportunity to choose the time to learn, e.g. taking into account his performance.

Examples of platforms that provide time flexibility for training are: Duolingo, LinkedIn, Coursera, Udemy and EdX. Referring to this factor, Artificial Intelligence in Duolingo can determine the time in which the course participant is able to perform, for example, his 5-minute foreign language training and each completed task by the student is updated in the model on a regular basis [7].

4.2. More customized training

Customization of training involves tailoring the content and methods of training to the needs and preferences of participants. LinkedIn Learning provides recommendations for students. It uses hyper-personalized models that learn from billions of coefficients. This recommendation engine allows them to offer personalized courses based on their interests and learning ambitions. This helps participants to develop new skills [8], [9]. In addition, generative models can be used for interactive learning – providing participants with personalized tutoring [5].

Tailored training includes features such as: a wide range of courses in different disciplines and levels, identification of skills gaps and competence development [10], [11] a comfortable and interactive way to learn (video, text, quiz, games, simulation, etc.), adaptation of the speed of learning and the method of learning to the student [7], quick review and feedback on assignments [5], [12].

4.3. Ability to find tailored training programs

Artificial intelligence enables the design and organization of online and onsite courses that are directly focused on the individual needs of employees [13]. According to [4], artificial intelligence is being used to tailor training programs by matching an employee's skills to future requirements of the labour market, e.g. EdCast. Generative models are able to provide a training program for those new to the profession, re-trainers, self-learner or for trainers within an organization, which can then inspire further learning.

4.4. Reduction in technological and social exclusions

The use of AI in HRM training is leading to a reduction in technological and social exclusions [14]. Technological exclusions refer to the gaps in digital skills and access to technology, which can make it difficult for some employees to keep up with the rapidly changing technological landscape. AI-based HRM training can provide personalized training programs to help employees develop the necessary skills and keep up with new technologies.

AI can provide personalized training to employees, which can help them learn at their own pace and in a way that suits their learning style [6], [15]. This can also help to eliminate technological exclusions by making training more accessible to employees who may not have access to traditional training methods [11], [16].

Social exclusions refer to the barriers that prevent individuals from accessing opportunities and resources due to factors such as race, gender, ethnicity, or disability. AI can help reduce social exclusions by providing unbiased assessments and training programs, promoting diversity and inclusion, and ensuring fair and equal access to opportunities. The Authors of [17] and [5] highlight that virtual simulations can allow employees to practice and learn in a safe home environment. Moreover, according to [14], AI-based HRM training can also help to overcome language barriers by providing multilingual support, allowing employees from different linguistic backgrounds to participate in training programs.

5. Economic impacts

The OECD document published in 2021 indicates that AI can improve the training area in an organization [18]. Perceiving the effectiveness of training in a broader, economic context, this positive impact can be seen in three dimensions: organization, processes (training) and the individual. Perceiving the discussed issues in the general organizational context, he adds new postulates that were not sufficiently emphasized in the analyzed literature. The implementation of AI in the area of training should not only be an element of decisions made at the HRM level, but should also be a component of a general organizational strategy aligned with the data management strategy, moving towards a data-driven organization. Data drivenness means that the organization consciously collects data to implement advanced AI/ML models, but develops internal competences and skills in this area. In essence, a data-driven organization is also a learning organization. Learning organization facilitates the learning of its members and continuously transforms itself [19]. AI has the capability to largely replace the role of organizations in this knowledge sharing process. The likelihood that an organization will achieve significant financial benefits thanks to AI may increase by following actions: (1) implementing AI in targeted applications, (2) applying AI solutions to various use cases, (3) scaling AI solutions in embedded solutions, knowledge sharing between humans and AI and structuring human-AI interactions, (4) learning and adapting through growing collective knowledge [20]. To achieve the effect of synergy across the organization to use of AI technologies, learning content, and pedagogical approaches should be integrated to maximize learning efficiency and effectiveness [21].

The impact of AI on the economics of business processes in the area of training can also be significant and fully scalable, from partial and autonomous re-engineering of business processes (BPR) up to their complete digitization and automation. AI-based learning systems can automate many training processes that are time- and cost-intensive in the analog world. Automation includes such training activities as identify weaknesses, and suggest corrective actions, provide huge resources of curated and tagged content, create multi-variant personalized and customized content and test questions. Automatic content translation in multiple languages (e.g. Udemy), assess a learner's behavior and align the learning with business outcomes [22]. The processes of digitization, virtualization and the use of AI tools create ideal conditions for a radical reduction in training costs. Effective management of the effectiveness of training processes should be fully integrated with the general business performance management (BPM) model. At the level of training process management, models such as activity-based management (ABM) and a balanced scorecard may be worth considering. This will create the conditions to control the effectiveness of training processes towards their radical reorganization (BPR) with the use of AI and ML.

The assessment of the economic effects of AI implementation in training processes would be incomplete if we did not notice and stimulate the increase in efficiency at the level of each employee. Nowadays, every employee can stimulate their professional development to a large extent, regardless of the participation of their employer in this process. The offer of academic-level training has never been so extensive and at low or no cost, taking into account MOOCs (e.g. Coursera, edX, Udemy). These low-cost training courses can be highly personalized. For example, recommendation systems in MOOCs suggest actions, new items and users, according to students' personal preferences [23]. One potential opportunity of using AI for training in HRM is to enhance learning opportunities for employees[16]. Remote learning significantly reduces travel costs and other fees because it can be accessed from anywhere and at any time, making it more convenient for employees to complete their training. Virtual training based on AI can reduce the use of raw materials required for physical training, such as equipment, supplies, and space, and the cost of employee travel and accommodations [15]. This can lead to better learning outcomes and increased employee productivity.

Assessing the problem from the perspective of business economics, it can be seen that AI not only saves training operating costs, but can also significantly minimize overall costs. The use of AI in HRM can help to streamline administrative work, making even the enrollment process faster and more efficient[17]. A holistic view of training should also include the measurement of effectiveness during and after training. One of the commonly known comprehensive models is Kirkpatrick's four-level model of training criteria published in 1959, which proposes measurement in four dimensions: (1) reaction of student, (2) learning - increase in knowledge or capability, (3) behavior - extent of behavior and capability improvement, (4) results - the effects on the organization [24]. MOOCs type platforms contain the basic elements of such measurement, but from the perspective of the organization it would be more reasonable to implement more comprehensive models, integrating LMS (learning management systems) with HRMS and feeding data into an AI-based performance measurement system.

6. Conclusion

The use of AI in HRM training has the potential to significantly improve an organization's efficiency, effectiveness and overall business performance, while providing employees with a more engaging and personalized learning experience. It creates opportunities for vulnerable groups, such as people with disabilities or those who face barriers to traditional training methods, provides personalized and accessible training programs that meet specific needs, additionally, it enhances learning opportunities for all employees by providing real-time feedback and adapting to individual learning styles. However, the implementation of AI in HRM also requires careful consideration of ethical and social implications, such as workers' fear of working with AI and the need to build trust between human workers and AI-enabled robots as team members. The use of AI in the area of training is a multithreaded and multidisciplinary issue, in which social sciences (management, business economics, pedagogy, psychology, etc.) and exact sciences related to the development and implementation of artificial intelligence and machine learning tools and algorithms play a significant role. Further development of research in this area requires close participation of specialists from various fields of science. A symptomatic distinguishing feature of the current situation is the revolution in data processing that has taken place in recent years. A decade ago, it was not so common to create advanced data processing models in any digital formats: numeric, text, images, video, sound. We are confident that future AI applications in the field of training will integrate these different formats into uniform applications to a much greater extent than today, which will make employee training even more attractive than it is today.

Future research is needed to further understand the impact of these factors in supporting employee development and how they affect employee engagement. This research will provide an in-depth exploration of the interaction between AI and HRM training, developing an understanding of the impact of these technologies on employees and organizations. Future research can focus on different areas that are central to HRM and the use of artificial intelligence. The effectiveness of personalized training can be investigated by looking at how tailored training programs affect employee skill development and engagement. The relationship between artificial intelligence and other areas of HRM can also be explored, for example how personalized training in an organization affects employee retention rates compared to organizations that do not offer such programs.

The implementation of artificial intelligence in HRM training is also worth exploring. As technology advances, the development of artificial intelligence becomes inevitable. However, it is crucial to explore the attitudes of HR professionals, employees and managers towards the implementation of such tools in the organization. Research can focus on identifying barriers and challenges to the introduction of artificial intelligence, as well as assessing the potential benefits. Research findings can help improve training programs, design better employee development strategies and improve employee engagement. Future research in this area will be an important contribution to the field of HRM and understanding the impact of artificial intelligence on organizations.

In a time where generative models are being developed, it is reasonable to examine their application in HRM training. Based on previous patterns and training data, generative models may generate new material. Training content such as simulations, interactive learning materials, or scenarios might benefit from generative models. In addition to building new models for various application areas, it would be important to test if existing tools (for example, ChatGPT, Chat Bing, Bard) are operating successfully in the field of staff training. The advantage of generative models is that they can generate realistic simulations and scenarios, for example, and employees trained in such an environment are subjected to safe tasks, allowing them to experiment and develop skills in a supervised environment. Therefore, there is a need for further research into training topics in different areas (e.g. aviation, IT, language learning, finance) using artificial intelligence. It is important to consider the limitations and problems of employing artificial intelligence in the field of human resource management. First and foremost, appropriate data management should be prioritized - data engineers, researchers, and other stakeholders are responsible for guaranteeing acceptable data quality while also considering the ethical implications of processing personal data of participants in different countries. It is also critical to monitor, evaluate and pick the correct indicators of effectiveness and efficiency while building such solutions to ensure high-quality training.

The growing interest in AI and the development of all kinds of models, especially large language models (LLMs), is leading to better and more efficient solutions, including GPT, LLaMa, PaLM etc. The report [25] points out that the difference between the GPT-3.5 and GPT-4 is huge, as the GPT-4 model performs better in the context of tests and examinations, including the Uniform Bar Exam, where the GPT-3.5 model failed the tasks and achieved a score of 10%, while the GPT-4 model achieved a satisfactory score of 90%.

In the future, AI's impact on HR will be concrete and long-lasting. To remain competitive, HR professionals must integrate AI into their procedures. This transformation will eventually lead to a reconsideration of the purpose and structure of individual HR positions and teams.

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