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HRM ALGORITHMS AND VALUE CREATION THROUGH AI IN TRAINING AND DEVELOPMENT

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Abstract: The purpose of this research study is to investigate the effect of HRM algorithms thorough Artificial Intelligence (AI) on small and medium-sized enterprises, with a specific focus on Learning and Development processes. Based on insights shared by technical and HR managers, this study shows that AI-driven HRM algorithms provide effective mechanisms for improving the efficiency of training sessions to cater learning interests while synchronizing it with business requirements. The results also suggest that although there is concern about AI replacing human teachers and the strategy of virtual classes, the potential benefits in changing the learning and development process makes it generally positive on deploying AI. In other words, AI could bring great hope of improving education/training and yet there are some limitations.

JEL Classification: M12, M15, M54

Keywords: HRM algorithms, Recruitment and Selection, HR procedure, software solutions

1. Introduction

Using the right HRM algorithms is essential for making insightful decisions (George, Haas, and Pentland, 2014). Remarkable digital enterprises such as Google, Microsoft, IBM, and Linkedin provide platforms or tools that facilitate the investigation of human resource management (HRM) activities, including recruiting, remuneration, employee engagement, and turnover control (Walter, 2018).

Nowadays, HRM procedures are increasingly performed using software algorithms—a group of computer-programmed instructions designed to automatically finish a task that transforms data into output (Meijerink and Bondarouk, 2023).

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Researchers looked at how workers are affected by algorithmic management because HRM algorithms automate decision-making about workers. The available evidence points in two important directions: first, researchers have shown that algorithms limit workers' job autonomy and value (Gandini, 2019); second, workers have attempted to regain autonomy and value by attempting to offset algorithm-enabled control (Meijerink and Bondarouk, 2023).

HRM academics have questioned the usefulness of algorithms in decision-making (Angrave et al., 2016) and have come to the conclusion that the tools' strategic worth is not well supported by data. Thus, the purpose of this study is to explain the significance of HRM in businesses and how it differs from the conventional statistical approach in its application.

2. Review of the scientific literature

It can be suggested to utilize the term "Algorithmic Human Resource Management" in order to gather information on actual topics to set the scene for this research. Actually, software algorithms are being utilized in the workplace to handle digital data and therefore HR decision-making procedures are becoming fully or partially automated. Nevertheless, the usage of digital data to support HR decision-making is growing. When everything is taken into account, these advancements are significantly changing the way labor is managed and HR procedures are carried out. The use of software algorithms that function on digital data to improve HR-related choices and/or automate HRM tasks is known as "algorithmic HRM" (Strohmeier, 2018; Veen et al., 2019).

Intelligent decision-making cannot be supported by the volume, velocity, and variety of big data (Laney, 2001) unless suitable algorithms are developed and applied. In today's digitalized workforce, the rapid increase in data is becoming more prominent, as noted by George, Haas, and Pentland (2014). To make sense of this data, it has become crucial to leverage algorithms for analysis. As a result of the increasing data-driven nature of HRM operations, there is a growing focus on developing and incorporating advanced HRM algorithms, particularly within the HRM domain.

Big Data is becoming more and more difficult to handle manually due to its immense volume and accelerating collection rate. In this case, data can be automatically and successfully altered using software approaches. Software algorithms are sets of computer-programmed instructions that automatically translate input into output to accomplish a task. (Meijerink et.al, 2021). Algorithms have been utilized in training and performance management to balance HR capacities versus developmental expectations (Lin & Hsu, 2010) and to anticipate competency gaps in software engineering management (Colomo-Palacios, et. al, 2014).

In today's workplace, HR processes such as coaching, mentoring, reskilling, onboarding, and upskilling have been seamlessly integrated with digital tools, modern innovations, and technology, thus creating a more hybrid work environment (Cheng and Hackett, 2021). Moreover, through an analysis of the practice-oriented literature, it was revealed that the implementation of bottom-up training algorithms empowers employees to identify their training needs and communicate them to their employer, leading to a more proactive approach to professional development (Cheng and Hackett, 2021).

According to Walker (2012), managers can learn about potential training needs at different stages of an employee's career by utilizing data collected from both current and former employees. Vencat (2006) discusses a platform that Cisco employees utilized to share movies, including ones from YouTube channels, in order to foster team learning. Engineers at Whirlpool have created an interactive webcast tutorial platform that enables them to share the training with other staff members across 70 countries and promptly resolve product concerns (Vencat, 2006). The academic community has not yet looked at the effects of self-driven, bottom-up on-the-job training methods that are partially made possible by algorithmic platforms. The research on this topic shows that automation and artificial intelligence (AI) have a significant impact on learning and development (L&D). For example, Bhatt and Muduli (2022) found that advances in artificial intelligence (AI) including robots, artificial neural networks, and natural language processing can improve the effectiveness of learning and development (L&D) processes, evaluate learners' aptitudes, and track learners' progress. In a similar way, Huang et al. (2021) highlight the benefits of AI for education and training, particularly for virtual classrooms and adaptive learning.

According to Roschelle et al. (2020), artificial intelligence (AI) can act as a toolbox, allowing us to study, imagine, and debate as-yet-unrealized future learning scenarios thus impacting the nature of labor in the future.

Even though there has been a considerable amount of discussion about the use of automation and artificial intelligence (AI) in learning and development (L&D) process, there are still unanswered questions. Focusing on the specific tools and algorithms utilized by businesses to automate their L&D processes and identifying industry best practices, this study aims to address these gaps. Additionally, it seeks to recognize and assess the impact of widespread AI adoption on the effectiveness of L&D within the IT&C industry in Romania.

3. Research methodology

We are conducting a study to explore the impact of AI on learning and development in the professional IT&C sector. Our primary goal is to investigate the following secondary objectives:

- Evaluate how AI influences training and development effectiveness in the accounting sector.
- Explore the potential of using AI in the accounting sector to improve learning and development outcomes.

Quantitative data was collected through a questionnaire (Milind Sathe, 2022) distributed among 20 technical and HR managers in Cluj-Napoca from small and medium-sized enterprises. The questionnaire, structured in a Google Form, was emailed to all managers to gather their feedback. The questionnaire consists of six parts:

Part A: Respondents' personal information;
Part B: Customizing the learning paths;
Part C: Strengthening Training and Development;
Part D: Including training criteria;
Part E: Emphasizing Virtual Learning;
Part F: Effectiveness in Learning and Development

There is much flexibility in the data analysis since all questions except those in section A are in the Likert scale format whereby responses range between strongly disagree (1) and strongly agree (5). The participants were engaged in answering a questionnaire which was then analyzed using MS Excel and SPSS software.
To adhere to research norms such as ethical considerations, all participants are provided with clear information about the study's objectives and their data will be used for academic purposes only.

With regard to respondents demographics, 31.3% are female and 68.8.% male (Figure 1); this data bringing to the fore the fact that in the IT&C industry the most managerial roles are dominated by males. Also, the most respondents have between 10 and 15 years experience (Figure 2), result that indicates that a managerial role comes with a lot of work and years of experience in the technological field.

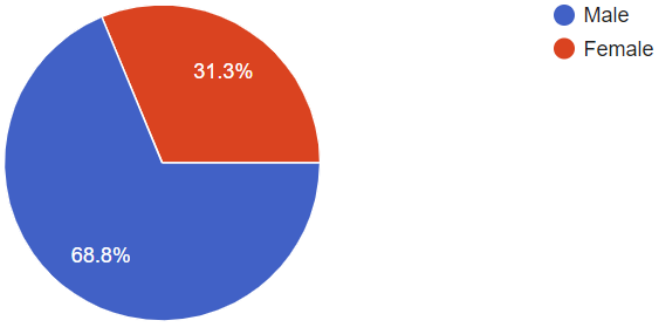

Figure 1: Respondents' gender

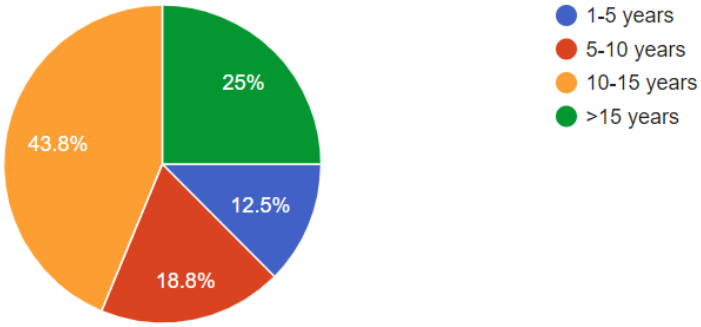

Figure 2: Respondents' experience

4. Results and discussion

The representation of the results was done following the model developed by Milind Sath (2022) in the thesis regarding the implementation of AI tools in the learning and development process in accounting. Each section from A to F will be analysed by using frequency analysis.

The survey results in Table 1 show that managers mostly think AI is pretty suitable for making training more personalized. Most of them agreed or strongly agreed that AI can figure out what each employees' needs and set up the right training for them. AI-powered personal learning plans can also help employees hit their learning targets better. All the same, AI-based assessments done by learning platforms seem to agree that they can make sensible predictions as long an employee set up some goals and give it a few specifics from their records. From this research perspective, it could be mentioned that this is clear validation that the use of AI to enhance training and personalized learning paths is a coherent goal. The results are also sustained by the literature evidence, which shows that HR professionals can customize solutions to meet the specific needs of each employee with the help of AI-driven tools that offer personalization and adaptability (Huang & Rust, 2021). This is evident in the fields of development and learning, where adaptive learning technologies offer individualized training opportunities that support employees in realizing their greatest potential (Brynjolfsson, Wang and Zhang, 2021).

Table 1: Personalizing the Learning Pathways by AI Adoption

Variables	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
AI is provided support to identify personalized learning requirements.	0%	0%	18.8%	43.8%	37.5%
AI makes it possible for training programmes to be tailored to the specific requirements of each individual worker.	0%	0%	18.8%	50%	31.3 %
Employees achieve their learning objectives more quickly because the learning pathways are designed as per personal preferences and objectives	0%	0%	12.5%	62.5%	25 %
AI-powered learning systems analyse each learner and recommend a learning programme based on his or her previous performance and objectives.	0%	6.3%	6.3%	56.3%	31.3%

Various viewpoints on the impact of automation and personalization in learning and development are summarized in Table 2. Although the majority of participants had varying opinions on automation being primarily a time saving tool, some were ambivalent and others disagreed entirely. A sizeable minority also believed that more representative input would help deliver a better, tailored learning and support experience overall; many were still undecided. In addition, many respondents indicated that they would support a targeted approach to higher completion rates as the best response (though several took no position on this question).

Most were in agreement that automating analysis to assess if learning is effective enough was something worth striving for, but a few others strongly disagreed or at least did not agree. These results show, that automation and personal performance feedback have a significant positive correlation on learning outcomes; however with some variability in the results. Nevertheless, the research results is supported by literature studies that mentioned that AI-driven technologies can also help with internal talent development by pointing out high-potential workers and recommending customized training programs (Saling & Do, 2020). To sum up, artificial intelligence (AI) and automation are vital to the recruitment and development of talent, revolutionizing the process and improving focused talent development.

Table 2: Reinforcing Training and Development by Adoption of AI

Variables	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
Automation of learning and development processes save time			25%	12.5%	62.5%
Employee engagement is increased by personalizing the learning and reinforcement processes.		6.3 %	25 %	37.5 %	31.3 %
Increasing completion rates by personalizing the learning and reinforcement processes.			12.5 %	62.5 %	25 %
Automation of analytics measure learning effectiveness of employees		6.3 %	18.8 %	25 %	50 %

Table 3 refers to how AI-powered learning systems is being perceived and the impact it has had on training and development process. Further, credit for believing AI helps learning get smoother and more structured. Most were in favour of this view however a few disagreed or had a neutral opinion. Regarding changing business environment, mostly has mixed opinion about automation in training and development requirements; some agreed with it when others disagreed or showed neutral feelings.

About reducing manual work (shortening the process of defining training needs) - most respondents thought it was useful, a few had no opinion on this or disagreed with it. Some only partially agreed or reported being neutral but the vast majority said that training was easiest to measure by its impact on employee performance. Moreover, the findings reveal that AI technologies have the potential to advance learning and education in many respects yet are also lacking on several issues. Through AI and automatization, organizations can increase overall productivity, decrease human error, streamline HR processes, and automate repetitive tasks (Bennett, 2022). These upgrades have the potential to save a large amount of money and free up funds for more important HR projects (Harrison et al., 2020).

Table 3: Integrating Training Requirements by Adoption of AI

Variables	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
A learning system, powered with AI simplifies the learning and development process		12.5 %	12.5 %	25%	50%
Training and development requirements are automatically integrated with the changes of the business environment		12.5 %	25 %	25 %	37.5 %
Time can be saved as minimization of manual works on identifying training requirements			26.7 %	26.7 %	46.7 %
The outcome of training can be easily measured with the performance of employees		6.3 %	25 %	6.3%	62.5 %

Table 4 provides perspectives on the impact of AI and virtual learning platforms on the training and development process. Whether AI tutors will take on the traditional roles of educators such as lecturers, trainers, or teachers is a different type of question with more diverse opinions.

While some respondents strongly opposed the concept, others were either neutral or believed that AI tutors could help with such tasks. Most respondents believed that virtual learning is a cost-effective solution, but a small number were opposed. There was no consensus on how employers should balance work pressures with virtual learning for their employees. For some, scheduling was a challenge, but for others, it was manageable. AI-Powered Virtual Learning AI-based virtual learning platforms were almost unanimously viewed as a valuable source of ongoing support for improving knowledge, skills, and abilities.

Table 4: Integrating Training Requirements by Adoption of AI

Variables	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
AI tutors can take the place of teachers, lecturers, speakers, and coaches.	18.8 %	25%	18.8 %	12.5%	25 %
Virtual learning flatforms are cost effective.			6.3 %	31.3 %	62.5 %
Employees can easily find time for virtual learning while performing in their jobs.		13.3 %	20 %	33.3%	33.3%
AI based virtual learning platforms provide continuous support to improve knowledge as well as skills.			18.8 %	37.5 %	43.8 %

These technologies, as shown in the literature, use adaptive learning platforms and intelligent tutoring systems to give workers individualized and enriching experiences (Huang, Saleh and Liu., 2021). Through the application of AI-driven

analytics, organizations can effectively identify skill gaps and anticipate future training needs upfront. In the end, this promotes strategic growth and advancement by enabling businesses to make more intelligent investments in learning and development initiatives (Saling & Do, 2020).

Table 5 provides some estimates of how much the introduction of AI might affect the effectiveness of learning and advancement. Many respondents believed that personalization of learning paths could be made more effective through AI. However, some respondents were neutral on this. Most recognized some benefits of AI but supported its use in training and development to varying degrees. While some respondents found it helpful to facilitate necessary preparation through AI, others remained meutral. Conversely, most respondents questioned the effectiveness of AI-powered instruction by either disagreeing or remaining neutral, reflecting uncertainty about virtual learning. Although AI is increasingly praised as an engine for learning and development, attitudes vary widely as to what value it can actually provide.

The main point made here is that automation and artificial intelligence (AI) can improve human resource development by using customization and adaptability as essential mechanisms. Customization can result in more interesting and productive learning opportunities, which can improve skill development and boost employee satisfaction (Kim, 2022).

Table 5: Effectiveness of Learning and Development

Variables	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
Personalizing the Learning Pathways by AI adoption improves the effectiveness of learning and development.			12.5 %	50%	37.5 %
Reinforcing training and development by AI adoption improves the effectiveness of learning and development.		6.7 %	20 %	40 %	33.3 %
Integrating training requirements by AI adoption improves the effectiveness of learning and development		6.3 %	25 %	43.8%	25 %
Focusing on virtual learning by AI adoption improves the effectiveness of learning and development			25 %	43.8 %	31.2 %

5. Conclusions

Research based on small and medium companies conducted among HR managers as well technical managers characterizes the impact of artificial intelligence (AI) in learning and development (L&D), intrinsic tendency is reframed. Most workers believe the use of AI can help tailor training programs to individuals' learning path,

better equip them with what they need in order for their learnings and experience lead to increased organizational success. That said, views on how effective and impactful the implementation of AI is can differ. Many believe that AI-powered learning platforms are beneficial in terms of ease of learning and provide personalized assistance suitable to their needs, with an individual approach for each employee. Nevertheless, the efficiency of AI to ultimately replace conventional educators altogether and maintain a balance between work commitments with distance learning remains unanswered.

The results show the necessity of more studies into implementation plans to AI-based learning and development solutions in practice. The use of artificial intelligence (AI) in training could therefore have a remarkable impact on the trainers' outcomes and customized learning experiences. So as to deal with such issues at an organizational level, it is important that there be continuous research and development as also echoed by other participants. Notwithstanding the fact that AI can revolutionize HR practices and instructional environments overnight, further investigations are still needed on this ground.

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