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Using artificial intelligence to optimize human resource management processes

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ABSTRACT

Incorporating technology into human resource management is at an advanced stage and is revolutionizing the existing environment of human resources. The study examines how human resource management processes can be optimized using artificial intelligence. A survey research design is employed by administering a questionnaire to the participants. The study population comprises employees of top HR outsourcing firms in five different cities in Ukraine. The stratified purposive sampling technique was deployed in drawing samples from the five cities using Raosoft sample size calculator, which gives a sample size of one hundred and sixteen (116) participants. Data collection was achieved with structured questionnaires to provide answers to research questions. We employed descriptive analysis of tables and regression analysis. The result revealed that efficiency at work can be improved with artificial intelligence in human resource management and decision-making. Also, artificial intelligence is germane to the process of human resource management. However, artificial intelligence suffers limitations in the areas of ethical consideration.

Keywords: Artificial intelligence, Employee development, Performance management, Recruitment, Performance management

1. Introduction

Over the years, Artificial Intelligence (AI) has developed to improve innovation strategically across diverse sectors, with Human Resource Management (HRM) being inclusive. Managing human resources is conducted manually, which is time-consuming and can be biased. A new light has been shed on processes such as performance evaluation, development training, and recruitment in firms, which have evolved through the adoption of AI. The abilities of AI have become well appreciated, as other related functions of human resources approve of the technology [1].

Artificial intelligence spans resume profiling, candidate assessments, and interviews using chatbots. The process thus becomes time-saving, and filtering of candidates for selection is enabled to avoid stereotyping and other biases that come with physical interaction. An objective performance assessment is better achieved through AI, as performance becomes easy to track with insights into data. The performance of employees and trends are trackable in real-time with apt feedback for managerial decision-making [2].

The development of employees, management of career paths, skills of employees, and opportunities for training with the support of AI allow for a seamless development plan in place that achieves organizational goals [3]. It is suggested that incorporating AI tools into HRM is an open ground for fairness and effectiveness in achieving a functioning organization. This does not exclude data collection, collation and analysis for human resources programs [4]. Also, collaboration between engineers and researchers will pave the way for increasing advances in innovative technology applications in various fields and disciplines [5].

1.1. Statement of the problem

Artificial intelligence presents hopeful solutions to improving HR processes by eliminating or mitigating biases rather than automating repetitive tasks. The continuing transformation occasioned by AI in the work environment encourages organizations to improve their practices of managing human resources to achieve optimum survival. Despite an acquaintance with robotics [6], AI, and automation as notable concepts, studies on the influence of applying AI in organizational management are lagging. HRM, as a renowned profession, is faced with challenges that require the attention of practitioners and academics to revisit procedures of managing Human resources. Minbaeva [7] emphasized the inadequate refining of research and practice of HRM. However, it is recognized that AI can probably reduce the efforts and time required by HR personnel to improve organizational productivity.

Organizations lack the understanding of deploying useful technologies and their influence on HRM [8]. Innovation in digital technology contributes to economic growth, but the merits and demerits must be considered alongside the requirement to manage risk proactively [9]. Adopting AI in workplace-related activities can achieve employee satisfaction, work-life balance and heightened productivity [10]. It is, therefore, essential to have an appreciable knowledge of the deployment of AI to HRM and related activities. Hence, the focus of this study is to systematically analyze the role of AI in optimizing HRM processes and evaluating its effectiveness, challenges, and prospects.

1.2. Research questions

The following are the research questions to be answered in the course of study:

i. What is the influence level of recruitment as a human resource management process using Artificial Intelligence?
ii. What is the relationship between performance management as a human resource management process and using Artificial Intelligence?
iii. What is the association between employee development as a human resource management process and using Artificial Intelligence?

1.3. Research objective

The general focus of the study is to evaluate the influence of artificial intelligence in optimizing human resource management processes. The specific focuses are to:

i. Establish the influence level of recruitment as a human resource management process by the use of AI;
ii. Investigate the relationship between performance management as a human resource management process and the use of AI;
iii. Analyze the association between employee development as a human resource management process and the use of AI.

1.4. Significance of the study

In the domain of HRM, Artificial Intelligence is evolving as a tool for human capital management and presenting firms with diverse prospects. This study focuses on how AI as an application can be deployed to optimize human resource management processes. The study assists in assessing probable risks related to deploying AI in HRM with procedures for reducing such risks.

The discoveries of this study will enable engaging AI as a technological tool in business to achieve competitiveness and economic development. Also, this study clarifies how AI can improve the satisfaction of employees and the effectiveness of organizations through enabling a conducive work environment.

1.5. Literature review

Most recently, the application of artificial intelligence to HRM has become prominent due to the merging of digital transformation, which is clearing the pathway for innovation to thrive. The deployment of artificial intelligence to HRM processes is a paradigm shift for business innovations, enabling improvement in processes for efficiency and superior precision in decision making.

1.5.1. AI and Recruitment as an HRM Process

The area of recruitment is the central domain in HRM, which makes significant deployment of AI. The prominence of AI is established in resume review, selection of candidates, interviews with chatbots, and a time-saving recruitment process with technologies that remove possible bias in line with human decisions [11]. The engagement of AI brings about ease for algorithms, which control and allow HR to concentrate on more pressing issues, such as education and skills, thus ensuring impartiality in the total process. Deployment of AI solutions for recruitment purposes involves recommending and predicting candidates suitable for job positions with improved quality of capable identified personnel [12].

1.5.2. AI and Performance Management as HRM Process

Another vital aspect of HRM regarding AI is performance management, where employee performance is assessed periodically. This is different from the usual performance assessments, which are annual exercises, as the conventional practice is now being replaced or improved upon by a constant and technology-based appraisal [13]. The system utilizes data analytics to assess employees' output, interpret findings and provide necessary feedback.

Previous records show that imminent performances can be extrapolated, resulting in a more efficient managerial decision [14]. For emphasis, the role of AI in performance management ensures precision and objectivity in assessment. Also, control and supervision measures on using resources to implement programs must be in place [15].

1.5.3. AI and Employee Development as an HRM Process

Artificial intelligence has been overwhelmingly helpful in contributing to employee growth capacity. Considering employee capability, skill set and objective, opportunities for development and training are developed through tailored algorithms [16].

Such platforms are an opinion for appropriate training courses and provision of materials for training to guarantee that employees access opportunities for development to fill the gaps in learning and meet the organization's objectives.

Assessment of the talent pool using tools of AI and models in statistics enables easy discovery of key skills deficiencies among the workforce while working on improving development and training programs. Efficient use of resources and innovations in functional areas of an organization contributes to improved production [17].

1.5.4. Implementation of AI and Ethical Considerations in HR

The integration of AI into HRM is not without disadvantages. This ranges from data privacy and protection of interest to confidentiality of information [18]. There is reflection and learning from the data fed into AI. Hence, biased data will produce a biased AI outcome in that inequalities in the workplace will be the order of the day [19]. There is the negative consideration that the evolution of AI technology will erase the need for hands-on professionals and, therefore, reduce the role of humans in HR resolutions.

The role of humans in managing HR processes has become watered down due to AI interventions, and this has been a subject of debate [20]. Future improvements in the deployment of AI technology are expected. The predictive analysis process and the process of evaluating demands for human capital are enhanced by AI as new competencies are developed [21]. Employees' experience is improved by raising employee engagement levels with AI, which is perceived as an organization's capacity to ensure an accommodating work environment by utilizing advanced technology [22]. This implies that organizations must imbibe best practices in implementing AI, especially in matters of corporate social responsibility.

1.5.5. Gap in literature

The growing pace of AI is expected to transform individuals' lives and the connection between customers and employees. The innovative technological revolution is reorganizing the workplace and entire organization on work schedules and managing time with job allocation [23]. Businesses are experiencing notable integration of digital processes and a shift into engaging AI in making decisions to ascertain an organization's growth and success [24].

Organizations must improve their activities' functions and human resources skills development to achieve optimum performance [25]. Most recently, organizations have begun to appreciate the importance and role of AI in the management of human resources as a way to endure the dynamic environment and live above

opposition [26]. Considering the infiltration of AI into virtually all disciplines and attracting attention, researchers focus now on instituting strategic management of human resources practices aided by AI [27]. Globally, organizations are confronted with time-saving and cost-mitigation tasks using the combined effect of AI, the Internet of Things and Machine learning in managing processes [28].

Efficient management of inventory and establishing relationships for job satisfaction can be made possible through a commitment to technology [29]. Without any doubt, AI creates a future in managing human resources. However, the challenge is that AI works as efficiently as humans in such a way that it does not depend on the quality of data input by humans and the protection of classified documents and strategies of an organization that may be unduly exposed. Hence, this study will add to the existing literature by highlighting how AI can optimize human resources management in recruitment, performance management and employee development.

2. Research designs

This study examined artificial intelligence in the optimization of human resource management processes. To this end, a descriptive survey design was employed in this study because it describes phenomena as they exist. The unit of analysis for this study was top HR outsourcing firms in Ukraine across Khmel'nyts'kyy, Kyiv, Lviv, Kharkiv and Odessa. Employees of the HR outsourcing firms made up the study population. Primary sources of data were considered for the study. The sampling technique employed is purposive stratified sampling. With the convenient population size of 165, using the Rasoft sample size calculator, the sample size equals 116. The questionnaire was divided into four sections. Section A consisted of Demographic Information, while Section B consisted of Artificial Development Scale. Section C consisted of the Human Resource Management Process Scale. The measures used five-point Likert scales starting from Strongly Agree to Strongly Disagree. Reliability and validity tests were carried out on the questionnaire, and a reliability coefficient of 0.84 was obtained for the Instrument's reliability, and experts' concurrence was obtained for validity. The data collected were subjected to Inferential and Descriptive Statistics. Specifically, the information was analyzed using the percentage and frequency counts for the demographic information, while Linear Regression was used to test the study's hypotheses. The formulated hypotheses were tested at a 0.05 alpha level.

2.1. Conceptual model

Figure 1 is a representation of the relationship between the variables under study. This study examines AI's influence on Human Resource Management processes. The HRM processes under consideration, recruitment, performance management, and employee development, are the dependent variables, while AI is the independent variable.

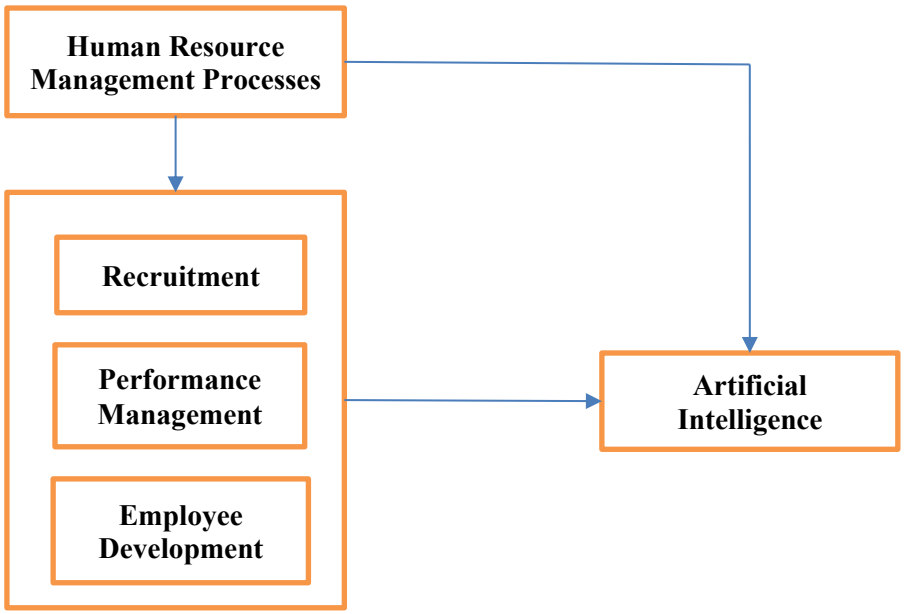

Figure 1. A model that depicts the relationship between Artificial Intelligence and the optimization of the Human Resource Management Process

Source: Author's model

2.2. Participants of the study

The survey involves personnel from various cadres and designations, including 116 who are either involved or experienced in using AI in human resource management. The respondents were selected from designated groups of project and HR managers, administrators, managing directors, business and program analysts, software engineers, and others. This study is in strict compliance with ethics guidelines.

2.3. Analysis of the data obtained

The detailed information about the personal characteristics of employees is presented in Table 1.

Table 1. Personal characteristics of employees

Demographics	Frequency	(n=116), %
Gender		
Male	38	44.6
Female	78	55.4
Total	116	100
Age (years)		
15-24	63	54
25-24	36	32
35-44	9	7.4
45-54	6	4.9
Above 55	2	1.7
Total	116	100
Marital status		
Married	94	81.2
Single	22	18.8
Total	116	100
Qualification		
Graduate	30	26
Post-Graduate	42	36
Professional	44	38
Total	116	100
Designation		
Project and HR Manager	18	15.2
Administrator	14	12.3
Managing Director	5	4
Business and Program Analyst	18	15.2
Software Engineer	35	30.5
Others	26	22.8
Total	116	100
Work experience (years)		
<5 Years	13	11
5-10	50	43
11-16	37	32
>16	16	14
Total	116	100

Table 1 details the characteristics of participants of the study, with expressions in frequencies and percentages for ease of identification and representation. Each variable is further depicted with interpretations below.

Figure 2 shows that out of 116 participants, 55% are female, and 45% are male. This implies that female employees took the survey, and the topic interested them.

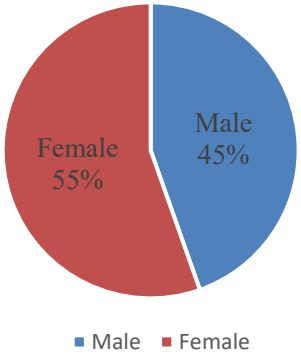

Figure 2. Gender of participants

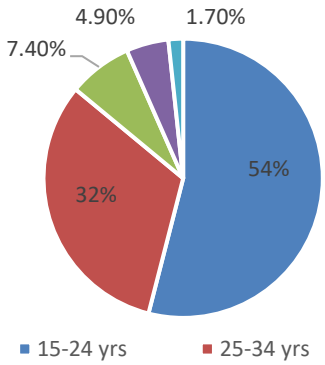

Figure 3. Age of participants

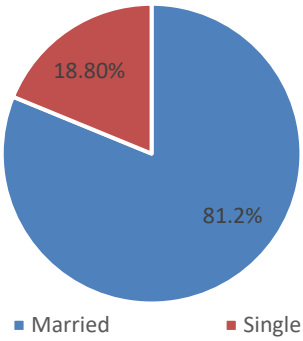

Figure 4. Marital status of participants

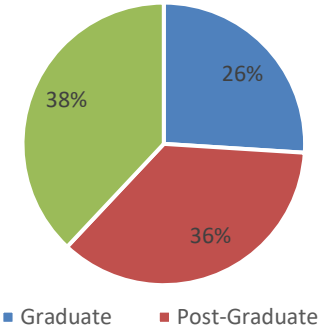

Figure 5. Qualification

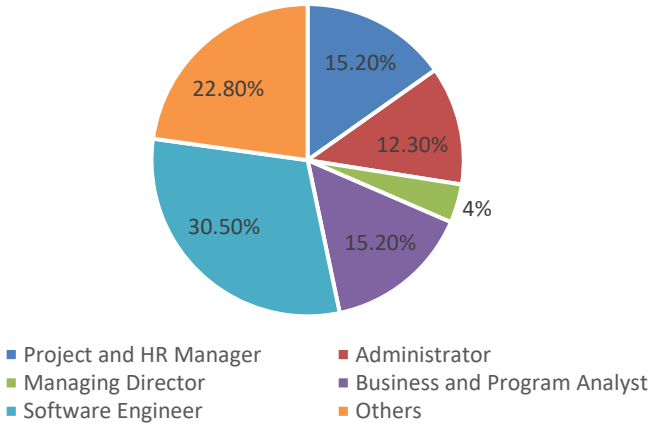

Figure 6. Designation of participants

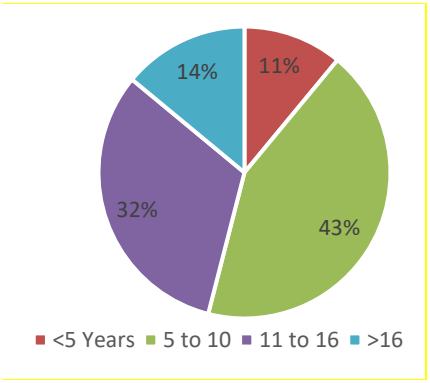

Figure 7. Work experience

The results in Figure 3 show that the majority, in total 86%, are in the age group of 15 and 34 years, which implies that, by comparison, young individuals were more enthusiastic about being part of the research. Figure 4 shows that 81.2 % of participants are married, and only 18.8 % are single/unmarried. According to educational qualification, it is divided into graduate, post-graduate, and professional categories. It was discovered that 26% of the participants were graduates, 36% possessed post-graduate degrees, and 38% possessed professional

degrees (Figure 5). This implies that most participants are literate enough to understand the purpose of the study. Data collection from employees in different positions inferred the majority of respondents as project and HR managers at 30.5% (Figure 6). This adds validity to the study as engineers know and appreciate the essence of technology in business. Figure 7 revealed that 11% of participants with less than 5 years' work experience took part in the study as the lowest category. In comparison, 43% of participants with 6-10 years' work experience were the maximum category in terms of work experience. This implies that most respondents have stayed long enough on the job to understand the study's implications.

The detailed information about the population of the study (HR outsourcing companies) was selected from the Best HR companies in Ukraine rating in 2025 (https://www.goodfirms.co/business-services/hr/ukraine) (Table 2).

Table 2. Population of study – HR outsourcing companies

Firm	No of Employees	Year Founded	City of Location in Ukraine
Avivi	10-49	2011	Khmel'nyts'kyy
Web Recruiters	10-49	2013	Kyiv
Echo Global	10-49	2013	Lviv
Capital Recruiters	10-49	2007	Kharkiv
Key People Recruiting	2-9	2012	Odessa

3. Results and discussion

The involvement of AI in the employee learning process has introduced dynamism in organizational management. The case study of the five Ukrainian firms (Table 2) has clarified that AI is germane to improving effectiveness in learning, bridging skill gaps, reducing training costs and charting appropriate career paths. The learning platform of the firms studied has improved by 35% and employee productivity by 20%. This agrees with the position that with AI, learning materials can be developed to meet specific learning needs efficiently, as against traditional training methods [30].

The coefficient of determination value ($R2 = 0.540$) indicated that the regression model could explain 54.0% of the variance in human capital development and, with a significant F-value ($F = 10.512$, $p < 0.05$), it could be concluded that the model predicted the outcome accurately. Table 3 also shows the independent variables' intercept term and the regression coefficients (β).

Table 3. Multiple regression analysis

Firm	Unstandardized coefficients		Standardized coefficients		
	β	Std. error	Beta	t	Sig.
Recruitment	0.141	0.418	0.278	2.267	0.001
Performance Management	0.533	0.215	0.484	2.271	0.0001
Employee Development	0.207	0.446	0.516	1.150	0.00009

The constant value (35.183) represented the intercept, which predicts that the dimension of human resource management processes does not account for artificial intelligence. The results show that recruitment had coefficients ($\beta = 0.141$, $t = 2.267$, $p = 0.001 < \alpha = 0.05$), indicating a significant relationship between recruitment as a human resource management practice and artificial intelligence. The findings of this study corroborate the findings of [31], who reported that recruitment significantly and positively influences human resource management processes ($r(98) = 0.401$). Furthermore, the findings of this study disagree with the findings that reported that recruitment is not a significant antecedent of human resource management practices [32]. However, the findings of this study agree with [33], who found that recruitment has a negative, but significant, impact on human resource management processes. Also, performance management had coefficients ($\beta = 0.533$, $t = 2.71$, $p = 0.0001 < \alpha = 0.05$), indicating a significant relationship between performance management and employee performance. This finding was supported by the fact that there was a significant relationship between human resource management process and artificial intelligence.

The necessity for performance management includes salary payment, bonus, promotion and others. Also, the findings aligned with the results, which indicated that performance management activities can be optimized

using artificial intelligence [34]. Finally, employee development had coefficients ($\beta = 0.207$, $t = 1.150$, $p = 0.0009 < \alpha = 0.05$), indicating a significant relationship between employee development and artificial intelligence. This was supported as an indication that employee development and training variables simultaneously affect the use of artificial intelligence [35]. In developing skills, AI has reduced the skills gap by 40%. This establishes the relevance of AI in employee preparation for career advancement in the organization. Also, the program on the development and management of talent at investigated five firms revealed that there is more effectiveness recorded by 30% and a reduction of the cost of training by 20%. The results, therefore, concur with studies that established that AI can handle humongous data and ensure employee satisfaction and motivation.

The application of AI to HR practices improves decision-making regarding employee development. Performance control is enabled and open for appropriate analysis. The deployment of AI must guarantee data protection and privacy and the elimination of bias. There must be proper control in place to take care of imminent lapses. The change management process must be apt and well communicated to employees in introducing AI to the workplace.

3.1. Limitations of the study

This study is limited to the human resources personnel of the studied organization who apply AI to human resources management practices [36]. Participants are limited by privacy and access to data, which may affect the outcome of findings; the validity of this study is not compromised.

4. Conclusions

The role of Artificial intelligence in employee development has been effective in ensuring enhanced productivity and learning compared to traditional approaches. Suppose the AI in HR practices is appropriately deployed. In that case, retention in learning is expected to increase by 30%, and the cost of training and career path will be managed appropriately. The challenges in AI implantation include employee acceptance of change, compatibility problems, breach of data privacy and possible bias. The development of AI welcomes pro-activity, progression, and employee satisfaction, as well as diverse paths for career development. Practicing HR professionals are expected to be able to handle current happenings in alignment with future resolutions presented by AI in improving programs for organizational development for a motivated and skilled workforce. The Platform of AI learning is improved by 35%, while employee productivity is improved by 20%. This implies that AI enables learners to work with materials that align with their learning needs.

Declaration of competing interest

The authors declare that they have no known financial or non-financial competing interests in any material discussed in this paper.

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Author contribution

The contribution to the paper is as follows: D. Kobets, D. Kasmin: study conception and design; S. Khruschak: data collection; D. Kasmin, J. Ziyautdinov, T. Vodolazhska: analysis and interpretation of results; T. Vodolazhska: draft preparation. All authors approved the final version of the manuscript.

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