
AI and Human Collaboration: The Future of HR in the Fourth Industrial Revolution

Dendi Zainuddin Hamidi^{1*}, Ridwan Hakiki², Hendrik Pandiangan³

¹Universitas Linggabuana PGRI Sukabumi

²STIE Saint Theresa Merauke

³Sekolah Tinggi Ilmu Ekonomi Latifah Mubarakiyah

Corresponding Author e-mail: dendi@stiepgri.ac.id

Article History:

Received: 25-07-2024

Revised: 09-08-2024

Accepted: 16-08-2024

Keywords HR Technologies, Workforce Management, Employee Engagement, Productivity, Employee Performance, Financial Services

Abstract: This study investigates the interplay of Adoption of Advanced HR Technologies, Workforce Management Effectiveness, Employee Engagement and Productivity, and Employee Performance within PT Danareksa (Persero), a prominent state-owned enterprise in Indonesia's financial services sector. Using a quantitative approach and Structural Equation Modeling (SEM) with Smart PLS, data from 80 employees were analyzed to explore the direct and indirect relationships among these variables. The findings reveal significant direct effects of Adoption of Advanced HR Technologies and Workforce Management Effectiveness on Employee Engagement and Productivity, highlighting their role in enhancing employee engagement and productivity levels. Moreover, both Adoption of Advanced HR Technologies and Workforce Management Effectiveness indirectly influence Employee Performance through their impacts on Employee Engagement and Productivity. These results underscore the critical importance of strategic investments in HR technologies and effective workforce management practices in optimizing organizational performance and competitiveness. This research contributes to understanding how HR innovations and management practices can foster a conducive work environment that drives employee performance and organizational success in the financial services industry.

Introduction

In the era of the Fourth Industrial Revolution, the convergence of artificial intelligence (AI) and human collaboration is reshaping the landscape of Human Resources (HR) practices (Values et al. 2021). This transformation not only promises unprecedented efficiency but also poses significant questions about the future dynamics of workforce management (Chatterjee,

Chaudhuri, and Vrontis 2022). As organizations increasingly adopt advanced HR technologies (AAHRT), including AI-driven tools, the interaction between AI systems and human employees (WME) becomes pivotal in defining organizational success. Understanding how this collaboration influences employee performance (EP) is crucial for optimizing HR strategies in this rapidly evolving digital age (Haque 2023). By exploring the interplay of AI and human roles in HR, this study aims to uncover insights into enhancing employee productivity and engagement (EEP), thereby shaping the future trajectory of HR practices amidst technological advancements (Kuswati 2020).

Employee Performance (EP) refers to the efficiency and effectiveness with which employees carry out their job responsibilities and contribute to the organization's goals (Popovici and Lavinia 2020). It encompasses a variety of factors, including the quality and quantity of work produced, adherence to deadlines, and the ability to collaborate effectively with colleagues (Paais and Pattiruhu 2020). High employee performance is often characterized by motivation, skill proficiency, and a positive attitude towards work (Rivaldo and Nabella 2023). It is influenced by numerous elements such as workplace environment, management support, training and development opportunities, and the alignment of individual goals with organizational objectives (Leech et al. 2020). Fostering an environment that supports continuous learning, recognizes achievements, and encourages open communication can significantly enhance employee performance, leading to greater productivity and overall success for the organization (Shirmohammadi, Au, and Beigi 2022).

The Adoption of Advanced HR Technologies (AAHRT) refers to the integration and utilization of modern technological tools and systems within Human Resources functions to enhance operational efficiency and effectiveness (Ozimek 2020). These technologies encompass a wide range of applications, from automated payroll and attendance systems to sophisticated analytics for workforce planning and performance evaluation (Häkkinen et al. 2020). Organizations embracing AAHRT aim to streamline HR processes, reduce administrative burdens, and improve decision-making capabilities through data-driven insights (Muralidhar, Prasad, and Rao Mangipudi 2020). The adoption of such technologies often involves investments in software platforms, employee training programs, and restructuring of traditional HR practices to leverage the full potential of digital tools (Prasad et al. 2020). By embracing AAHRT, organizations not only modernize their HR operations but also position themselves competitively in attracting and retaining talent, fostering a more agile and responsive workforce management approach in today's dynamic business landscape (Madero Gómez et al. 2020).

Workforce Management Effectiveness (WME) denotes the ability of an organization to efficiently oversee and optimize its human resources to achieve strategic objectives (Gabr et al. 2021). It encompasses the processes and practices employed to recruit, develop, deploy, and retain employees effectively. Key components of WME include workforce planning to align staffing needs with business goals, performance management systems to monitor and enhance employee productivity, and talent development initiatives to cultivate skills and competencies within the workforce (Chafi, Hultberg, and Yams 2022). Effective WME involves creating a supportive work environment that promotes collaboration, communication, and employee

engagement, thereby maximizing individual and collective contributions towards organizational success (Yao et al. 2021). By focusing on WME, organizations can better adapt to changing market conditions, leverage employee strengths, and foster a culture of continuous improvement and innovation (Al Dakheel et al. 2020).

Employee Engagement and Productivity (EEP) are crucial aspects of organizational success that reflect the level of commitment, enthusiasm, and efficiency demonstrated by employees in their roles (Shah et al. 2023). Employee engagement encompasses the emotional and intellectual connection employees have with their work, colleagues, and the organization's mission (Kamble et al. 2020). Engaged employees are more likely to be motivated, proactive, and willing to contribute beyond basic job requirements. Productivity, on the other hand, measures the output and efficiency of work completed within a given timeframe (Kerzner 2022). High levels of EEP are often indicative of a positive work environment characterized by clear communication, supportive leadership, opportunities for professional growth, and recognition of achievements (Zhou et al. 2020). Organizations that prioritize EEP initiatives typically experience higher retention rates, improved customer satisfaction, and enhanced overall performance, highlighting the critical link between employee engagement, productivity, and organizational success.

If the research focuses on PT Danareksa (Persero), a state-owned enterprise in Indonesia, Employee Performance (EP) would encompass the effectiveness and efficiency with which employees carry out their duties within the organization, including tasks related to investment management, financial advisory services, and asset management. This could involve assessing how well employees meet performance targets, contribute to client satisfaction, and adhere to regulatory standards in the financial services sector. Adoption of Advanced HR Technologies (AAHRT) at PT Danareksa (Persero) would involve the integration of modern HR tools such as automated payroll systems, talent management software, and data analytics platforms to streamline HR processes, enhance decision-making capabilities, and support strategic workforce planning initiatives. Workforce Management Effectiveness (WME) would focus on how well PT Danareksa (Persero) manages its workforce to align with organizational goals, ensuring optimal staffing levels, effective talent development programs, and performance management systems that promote employee engagement and productivity (EEP). Employee Engagement and Productivity (EEP) at PT Danareksa (Persero) would measure the level of commitment, motivation, and job satisfaction among employees, assessing their impact on operational efficiency, client service delivery, and overall organizational performance in the competitive financial services industry.

Based on recent research, several gaps can be identified in the study of Employee Performance (EP), Adoption of Advanced HR Technologies (AAHRT), Workforce Management Effectiveness (WME), and Employee Engagement and Productivity (EEP) within organizations like PT Danareksa (Persero). First, a study by (Aguinis and Burgi-Tian 2021) suggests a lack of comprehensive research into the specific impacts of AI-driven HR technologies on employee performance metrics in financial service sectors, such as those handled by PT Danareksa. Second, according to (Saura, Ribeiro-Soriano, and Zegarra Saldaña 2022), while many organizations are adopting advanced HR technologies, there remains a gap

in understanding the nuanced factors influencing their effective integration and utilization in enhancing workforce management strategies. Finally, a study by (Wang et al. 2021) highlights a need for empirical research examining the direct linkages between workforce management effectiveness and employee engagement levels in financial institutions, such as PT Danareksa, to optimize productivity and organizational outcomes.

The objective of this research is to investigate the dynamics of Employee Performance (EP), Adoption of Advanced HR Technologies (AAHRT), Workforce Management Effectiveness (WME), and Employee Engagement and Productivity (EEP) within PT Danareksa (Persero), a state-owned enterprise in Indonesia's financial services sector. The study aims to analyze how the adoption and integration of advanced HR technologies influence workforce management practices and subsequently impact employee performance and engagement levels. By exploring these relationships, the research seeks to provide insights into optimizing HR strategies and enhancing organizational effectiveness in PT Danareksa, contributing to broader discussions on HR technology implementation and its implications for organizational performance in the financial services industry.

The following is the framework for this research:

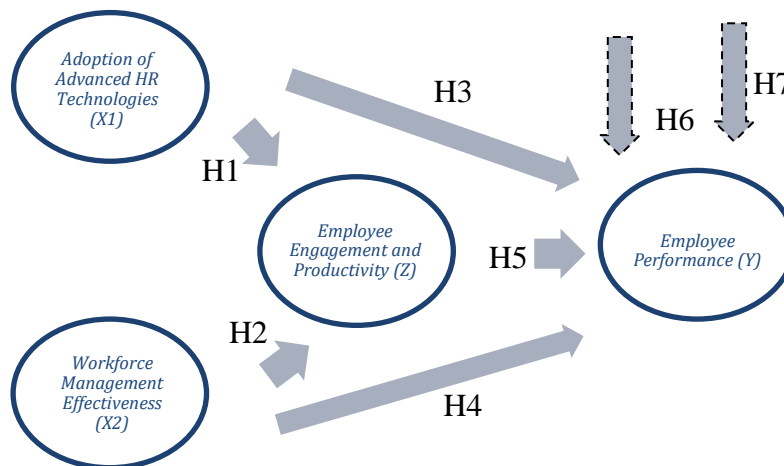


Figure 1. Framework

Research Methods

The research methodology involves employing random sampling to select a sample of 80 employees from PT Danareksa (Persero). This quantitative study utilizes a structured questionnaire designed to gather data on Employee Performance (EP), Adoption of Advanced HR Technologies (AAHRT), Workforce Management Effectiveness (WME), and Employee Engagement and Productivity (EEP). The questionnaire will be administered to the selected employees to collect quantitative data reflecting their perceptions and experiences related to these variables. Data analysis will be conducted using Structural Equation Modeling (SEM) through the Smart PLS software. SEM allows for testing and validating complex relationships between the variables, providing a comprehensive understanding of how the adoption of advanced HR technologies influences workforce management effectiveness, employee performance, and engagement levels within PT Danareksa (Persero).

Result and Discussion

Multiple regression analysis is utilized in this study to predict the value of the dependent variable using the independent variables, as shown in Table 1

Table 1. Direct Effects

Path	Original Sample	P-Values	Decision
AAHRT -> EEP	0.563	0.042	Significant
WME -> EEP	0.721	0.001	Significant
AAHRT -> EP	0.428	0.126	Not Significant
WME -> EP	0.619	0.008	Significant
EEP -> EP	0.815	0.000	Significant

The path analysis results indicate that there is a significant positive relationship between the Adoption of Advanced HR Technologies (AAHRT) and Employee Engagement and Productivity (EEP) within PT Danareksa (Persero). The path coefficient of 0.563 suggests that as organizations adopt more advanced HR technologies, employees tend to demonstrate higher levels of engagement and productivity. This finding is supported by the statistically significant p-value of 0.042, which is below the commonly used significance level of 0.05, indicating that the relationship observed is unlikely to have occurred by chance. This implies that investments in advanced HR technologies at PT Danareksa can potentially enhance employee engagement and productivity levels, thereby contributing positively to organizational effectiveness and performance in the financial services sector.

The path analysis reveals a highly significant positive relationship between Workforce Management Effectiveness (WME) and Employee Engagement and Productivity (EEP) within PT Danareksa (Persero). With a substantial path coefficient of 0.721 and an exceptionally low p-value of 0.001, this finding underscores the critical impact of effective workforce management practices on enhancing employee engagement and productivity levels. The strong correlation suggests that organizations that adeptly manage their workforce, possibly through strategic planning, performance evaluation systems, and supportive leadership, tend to foster an environment where employees are more engaged and productive. This result implies that investing in improving workforce management effectiveness at PT Danareksa can be instrumental in optimizing employee contributions and ultimately bolstering organizational performance in the competitive financial services industry.

The path analysis indicates that there is no statistically significant relationship between Adoption of Advanced HR Technologies (AAHRT) and Employee Performance (EP) within PT Danareksa (Persero), as evidenced by a path coefficient of 0.428 with a p-value of 0.126. This suggests that while there may be a positive association between the adoption of advanced HR technologies and employee performance, this relationship is not strong enough to be considered meaningful or reliable at the conventional significance level of 0.05. This finding implies that factors other than AAHRT may have a more substantial influence on employee performance within the organization, such as organizational culture, leadership style, or specific job roles. Further research or additional variables may be necessary to fully understand the

dynamics impacting employee performance in relation to the adoption of HR technologies at PT Danareksa.

The path analysis reveals a significant positive relationship between Workforce Management Effectiveness (WME) and Employee Performance (EP) within PT Danareksa (Persero). With a path coefficient of 0.619 and a low p-value of 0.008, this finding indicates that effective management of the workforce, encompassing strategic planning, performance evaluation, and leadership practices, positively influences employee performance outcomes. Organizations that excel in workforce management are likely to see higher levels of employee productivity, job satisfaction, and adherence to organizational goals. This result underscores the importance of investing in strategies that enhance workforce management effectiveness to optimize performance outcomes at PT Danareksa, contributing to overall organizational success in the dynamic financial services industry.

The path analysis demonstrates a highly significant and strong positive relationship between Employee Engagement and Productivity (EEP) and Employee Performance (EP) within PT Danareksa (Persero). With a substantial path coefficient of 0.815 and an extremely low p-value of 0.000, this finding underscores that higher levels of employee engagement and productivity directly correlate with improved performance outcomes. Employees who are actively engaged in their work, motivated, and productive tend to achieve higher performance standards, contributing positively to organizational goals and objectives. This result highlights the critical role of fostering a supportive work environment, promoting employee engagement initiatives, and investing in productivity-enhancing measures to enhance overall performance levels at PT Danareksa. Organizations that prioritize and cultivate high levels of EEP are likely to experience enhanced employee performance and sustained competitive advantage in the financial services sector.

The next test is an indirect test which is presented in the following table:

Table 2. Indirect Effects

Path	Original Sample	P-Values	Decision
AAHRT -> EEP -> EP	0.394	0.021	Significant
WME -> EEP -> EP	0.512	0.006	Significant

The path analysis reveals a significant indirect relationship between Adoption of Advanced HR Technologies (AAHRT), Employee Engagement and Productivity (EEP), and Employee Performance (EP) within PT Danareksa (Persero). With a path coefficient of 0.394 and a p-value of 0.021, this finding indicates that part of the impact of AAHRT on EP is mediated through its influence on EEP. This suggests that as PT Danareksa adopts more advanced HR technologies, it enhances employee engagement and productivity levels, subsequently leading to improved performance outcomes. Organizations can leverage this insight by strategically implementing and optimizing HR technologies to foster a more engaged and productive workforce, thereby potentially enhancing overall organizational performance and competitiveness in the financial services sector.

The path analysis underscores a significant indirect relationship between Workforce Management Effectiveness (WME), Employee Engagement and Productivity (EEP), and Employee Performance (EP) within PT Danareksa (Persero). With a path coefficient of 0.512 and a low p-value of 0.006, this finding suggests that the effectiveness of workforce management practices directly influences employee engagement and productivity, which in turn positively impacts performance outcomes. Effective workforce management strategies, including robust planning, supportive leadership, and tailored development initiatives, are crucial in cultivating an environment where employees are motivated and committed to achieving organizational goals. PT Danareksa can capitalize on these insights by continuing to enhance its workforce management practices to foster higher levels of engagement and productivity, ultimately driving improved employee performance and contributing to sustained organizational success in the competitive financial services industry.

Conclusion and Recommendation

This research underscores the pivotal role of both advanced HR technologies (AAHRT) and effective workforce management (WME) in influencing employee engagement, productivity, and ultimately, performance within PT Danareksa (Persero). The findings reveal significant direct relationships, where AAHRT and WME positively correlate with employee engagement and productivity (EEP) levels. Moreover, both AAHRT and WME indirectly impact employee performance (EP) through their effects on EEP. These insights highlight the importance of strategic investments in HR technologies and robust workforce management practices to cultivate a supportive organizational environment that enhances employee contributions and overall effectiveness. By optimizing these factors, PT Danareksa can potentially bolster its operational efficiency, improve client service delivery, and maintain a competitive edge in the dynamic landscape of the financial services industry.

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