Integrating Sustainable HRM, AI, and Employee Well-Being to Enhance Engagement in Greater Jakarta: An SDG 3 Perspective

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Abstract. This study explores a combination of Sustainable Human Resource Management and Artificial Intelligence on employee well-being with a view to improving employee engagement for workers in Greater Jakarta, Indonesia. We applied Chi-Square and Rasch Model analyses on data collected from a cross-sectional survey of 366 employees. The results yield significant positive associations between the sustainability of HRM practices and employee engagement along with those of well-being and engagement. However, it also noted that the integration of AI technology enhances employee engagement by reducing workload and enhancing decision-making support. Therefore, these findings emphasize the need to adopt sustainable HRM practices that aim to guarantee employee welfare and well-being, resulting in a more productive and engaged workforce. Contribution to the literature: A multidimensional model of employee engagement that integrates the role of sustainability, well-being, and technology. Practical implications include organizations investing in holistic HRM strategies that are commensurate with their sustainability goals and using AI to leverage value-added responses in employees. Future research directions could also be suggested, such as longitudinal studies and a broader approach to sampling, thereby enhancing generalizability across diverse contexts.

1 Introduction

Employee well-being extends beyond financial compensation; it includes initiatives that promote work-life balance, career development, and mental health support. The Asia Pacific Workforce Hopes and Fears 2023 Survey [1] indicates that many Indonesian employees report high job satisfaction and feeling valued by their organizations. However, there are concerns about inadequate support for skills development, which can negatively

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impact long-term engagement and retention [1]–[3].

Organizations that invest in holistic well-being tend to achieve better performance and higher retention rates. Effective well-being strategies significantly enhance workplace culture, leading to sustained competitive advantages [4]. A positive work environment boosts employee morale and productivity. Therefore, integrating comprehensive well-being programs is essential for fostering employee engagement and facilitating company growth in an evolving business landscape [1], [4], [5]. Research consistently demonstrates that employee engagement is crucial to productivity and overall company performance. The Asia Pacific Workforce Hopes and Fears Survey 2023 reveals high job satisfaction and a sense of being valued among Indonesian workers [1]. However, significant gaps in career growth opportunities could hinder employee retention [1], [4].

The increasing adoption of Artificial Intelligence (AI) in business operations introduces both challenges and opportunities for enhancing engagement and productivity [6]–[8] AI is moderating at the intersection of sustainable HRM, employee well-being, and engagement. AI can significantly enhance traditional HR practices by focusing on long-term sustainability and employee welfare. It improves organizational performance management, training, and employee development through accurate data analysis and advanced personalized recommendations. For instance, AI-driven insights can tailor career development strategies, increasing employee engagement and well-being [6], [7]. In this context, AI moderates the relationship between sustainable HRM and employee well-being, creating technology ecosystems that enhance human contributions without replacing them. Organizations that effectively integrate AI to support their employees are more likely to achieve long-term HRM goals, ultimately enhancing employee engagement and well-being [6], [7], [9].

Yet, integrating sustainable Human Resource Management (HRM) practices with AI remains largely unexplored. This study wants to explore the impact of sustainable HRM on employee engagement and well-being, as well as how AI can enhance these initiatives.

2 Literature Review

2.1 The Correlation of Sustainable Human Resources Management and Employee Engagement

Sustainable Human Resource Management (SHRM) views employees as valuable resources by considering their preferences, needs, and perspectives. This approach prioritizes individual employees, emphasizing work engagement and satisfaction as key outcomes [10]. By fostering a supportive work environment, offering development opportunities, and enhancing employee retention, effective SHRM can significantly increase engagement and job satisfaction, which are the primary goals of the framework.

Research indicates that high employee engagement stems from feeling valued, trusting management, and believing that their contributions are vital to organizational success[11]. SHRM reinforces this relationship through transparent, fair, and consistent policies while promoting employee interaction and cooperation. Thus, the correlation between SHRM and employee engagement is mutually reinforcing: effective HR strategies create environments conducive to engagement, which, in turn, supports the long-term success of the organization [12]. Therefore, the proposed hypothesis is

H1: There is a significant correlation between sustainable HRM and Employee Engagement

2.2 The Correlation of Well-Being and Employee Engagement

Employee well-being, encompassing both physical and psychological aspects, is essential for optimal performance. Employees with high well-being demonstrate greater engagement, which contributes to organizational success [13]. Research shows that highly engaged employees experience positive feelings associated with well-being, reinforcing their performance [13]. Organizational initiatives to enhance well-being act as job resources, addressing physical, psychological, social, and organizational factors that help employees complete tasks and alleviate job demands. These resources foster a collaborative work culture, leading to a positive environment. Access to such resources is linked to increased performance, higher productivity, and greater effort [14][15].

Moreover, employee well-being encompasses job satisfaction, respect within the organization, work-life balance, employer support, autonomy, competence, and relatedness needs. Improving well-being is crucial for boosting work engagement; neglecting it can lead to decreased engagement, negatively impacting productivity and increasing costs [16]. Healthy organizations implement processes to enhance employee well-being, resulting in effective performance [17]. A supportive work environment that prioritizes psychological well-being fosters sustained employee engagement, making well-being a critical factor in maintaining high engagement levels [17]. Accordingly, the put-forward hypothesis is

H2: There is a significant correlation between well-being and employee engagement

2.3 The Correlation of AI Technology and Employee Engagement

The relationship between Artificial Intelligence (AI) technology and work engagement encompasses both potential benefits and challenges associated with AI integration in the workplace. AI can enhance work engagement by fostering a symbiotic relationship between employees and technology. This partnership improves performance by reducing cognitive load and streamlining tasks, enabling employees to concentrate on more complex and creative work [18], [19]. [19] emphasizes that successful AI-driven systems depend on collaborative interactions between employees and AI, suggesting that proper integration can augment human capabilities and enhance overall engagement [19] [20]. Additionally, Fukumura et al. advocate for a transactional perspective that considers the interplay among workers, technology, and the workplace environment, leading to more effective AI solutions that support employee engagement [21]. Additionally, Kaczorowska-Spychalska highlights that AI can enhance knowledge sharing and collaboration, further bolstering engagement by facilitating knowledge management and employee interaction [22][8][23]. As a result, the hypothesized statement is

H3: There is a significant correlation between AI technology and employee engagement

3 Research Methodology

3.1 Research Design and Approaches

This study aims to evaluate the relationship between sustainable HRM, employee well-being, AI technology, and employee engagement among Indonesian workers in Greater Jakarta, Indonesia's dynamic capital. The research follows a structured methodology, establishing a theoretical foundation for hypothesis development. It then proceeds to collect sample data essential for testing these hypotheses. This research utilized a cross-sectional survey and a quantitative design to test the newly developed conceptual model and its

hypothesized relationships through Rasch Model Analysis and Chi-Square Analysis.

3.2 Data Collection

Data sources in this research encompass all information related to the topic under investigation and are categorized into primary and secondary sources. Primary data was collected using techniques such as observation, interviews, and experiments [24]. In this study, a questionnaire was distributed via Google Forms from January to June 2024 to gather primary data. Secondary data, including literature, journals, articles, and various online sources, was also utilized to enhance existing knowledge.

The research focuses on employees in organizations located in the Greater Jakarta Area as the capital city of Indonesia. However, the exact population size of employees in Indonesia is currently unknown. Therefore, the sample size will be determined using the Lemeshow formula [24]. This study adopts a 5% error level, corresponding to a 95% confidence level and a maximum estimation of 25%. The Z-score for a 95% confidence level is 1.96. Based on these calculations, a sample size of 288 respondents is required. To account for potential errors in questionnaire completion, the sample size is rounded up to 300 respondents.

This study employed a convenience sampling procedure due to the absence of a sampling frame, which also streamlined the process. Despite the inherent limitations of this method, we reached out to 450 employees in Greater Jakarta via email, LinkedIn, and WhatsApp groups, ensuring participation was voluntary. A total of 388 questionnaires were returned and considered for statistical analysis. Using the Rasch Model and Person Measure Analysis with WINSTEPS software version 5.2.1.0 [25], [26], we eliminated 22 incomplete questionnaires and outliers. This resulted in a final sample of 366 respondents, yielding a response rate of 82%, which is relatively high.

3.3 Research Instrument

The questionnaire items were created based on some scholars' works, as shown in the following table (Table 1).

Table 1. Research Instrument

Variables	Code	Items
Sustainable HRM [12], [27], [28]	SHRM 1	In my company, employees who voluntarily behave to preserve the ecosystem receive support.
	SHRM 2	My company's work is organized so that employees can interact with stakeholders.
	SHRM 3	In my company, there are opportunities for employees to make decisions that benefit the company and stakeholders
	SHRM 4	In my company, employee performance evaluation includes the ability to balance profit, people, and the environment
	SHRM 5	In my company, building internal and external relationships is considered in the employee selection process.
	SHRM 6	In my job, the ability to build internal and external relationships is considered in the employee selection process.
	SHRM7	In my company, employee training focuses on developing skills and attitudes to manage stakeholder interests
Well-Being [13], [14], [29]	WB 1	Promotion opportunities are open for my job
	WB 2	I am satisfied with the company's benefits package
	WB 3	I receive recognition when I perform well

Variables	Code	Items
	WB 4	I like my friends at the office
	WB 5	My job is meaningful
	WB 6	Promotion opportunities are fair for high-performing employees.
	WB 7	My supervisor treats their subordinates fairly.
	WB 8	My colleagues are competent.
	WB 9	Promotion opportunities are open for my job
	WB 10	I am satisfied with the company's benefits package
	WB 11	I receive recognition when I perform well
	WB 12	I like my friends at the office
	WB 13	My job is meaningful
	WB 14	Promotion opportunities are fair for high-performing employees.
	WB 15	My supervisor treats their subordinates fairly.
	WB 16	My colleagues are competent.
AI Technology [1], [19]	AI 2	AI provides opportunities to learn new skills
	AI 3	AI has a positive impact on my job
	AI 4	AI creates new opportunities for me
	AI 5	I can learn new things with AI
	AI 6	AI will harm my job
	AI 7	AI can replace my job
	AI 8	AI provides new ways for me to work
Work Engagement [30]	EE 1	I feel enthusiastic about work
	EE 2	My job is meaningful
	EE 3	Time passes quickly when I work
	EE 6	My job is inspiring

Source: Authors, 2023

3.4 Validity and Reliability of Research Instrument

Rasch model analysis is employed to evaluate the validity and reliability of the research instrument. As shown in Table 2, the instrument's reliability of the instrument is indicated by Cronbach's Alpha values, which are 0.76, 0.84, 0.62, and 0.75.

Table 2. Validity and Reliability Testing Results (Rasch Model).

Variable	Alpha Cronbach	Reliability		Result
		Person	Item	
SHRM	0.76	0.75	0.76	Valid and reliable
Well-Being	0.84	0.83	0.74	Valid and reliable
AI Tech	0.62	0.53	0.84	Valid and reliable
EE	0.75	0.72	0.79	Valid and reliable

Source: Primary Data, 2024
Notes: SHRM (Sustainable Human Resource Management); EE (Employee Experience)

The responses related to the participants' comprehension reflect moderate reliability, with

values of 0.75, 0.83, 0.53, and 0.72. In contrast, the item responses exhibit good reliability, with values of 0.76, 0.74, 0.84, and 0.79. These scores suggest a high level of consistency, indicating a strong correlation between the questionnaire items and the respondents' answers. The instruments utilized to assess the research variables effectively capture the intended data with a reasonable degree of reliability [25], [26]

3.5 Data Analysis

The data collected in this study was analysed using the Rasch Model, with the support of WINSTEPS software version 5.2.1.0. The Rasch Model is particularly well-suited for quantitative analysis in human sciences, mainly when the research instruments produce ordinal data [25], [26]. Rasch model analysis is based on probability and reliably predicts respondents' replies to all items. In addition, the Rasch Model translates ordinal data such as Likert rating scale item scores to an interval scale known as unit of opportunity logarithms (logit) [25], [26], [31].

The research hypotheses will be explored using two distinct statistical techniques: Rasch Model Analysis and Chi-Square Analysis with support of IBM SPSS Statistics 27. The Chi-Square test is designed to identify relationships between variables categorised in a matrix of rows and columns. This test is specifically suited for data that is either nominal or ordinal [32], [33].

4 Results and Discussion

4.1 Demographics of Respondents

The respondents in this study exhibit diverse demographic and professional characteristics. Gender distribution indicates a higher proportion of male respondents at 60.1%, compared to 39.9% female, reflecting significant male dominance in the sample. In terms of age, the majority of respondents (48.4%) are in the 21-30 age group, followed by 32.2% aged 31-40. Those aged 19-20 make up 11.2%, while respondents aged 41-50 and over 50 years constitute smaller groups at 7.7% and 0.5%, respectively. This suggests a relatively young sample, with many in the early to mid-career stages.

Educational attainment is predominantly high, with 95.9% of respondents holding a Bachelor's degree, and only 4.1% having completed high school (SMA/SMK). This indicates that respondents are well-qualified and likely possess the necessary skills for their roles. Regarding work experience, 54.4% of respondents have less than ten years of experience, with 29.5% having under five years. Only 0.3% have over 20 years of experience, suggesting a workforce largely new to the job market.

In terms of job levels, the majority are officers (54.4%), followed by supervisors (23.5%), contract workers or interns (12%), managers (7.1%), and senior or general managers (2.5%). Associate directors or directors are the least represented, at 0.5%, indicating that most respondents occupy entry- to mid-level positions.

4.2 Rasch Model Analysis

The Rasch analysis is being conducted across various subgroups, with subtotal values representing the sum of raw scores for each group. Table 2 presents the findings from the Rasch Model Analysis concerning work engagement in relation to sustainable HRM, well-being, and AI technology.

The results (Table 3) from the Rasch model reveal significant relationships among several key variables: Sustainable HRM, Well-Being, and AI Technology. Each of these variables demonstrates specific metrics. For Sustainable HRM, the measure stands at 1.67

logit, with high and low group measures recorded at 2.68 and 1.04, respectively. The Welch two-sided test yields a p-value of 0.000, indicating a statistically significant difference in engagement with sustainable HRM practices between the high and low groups.

Similarly, Well-Being also has a measure of 1.67 logit, with high and low group measures at 2.78 and 1.05. The consistent p-value of 0.000 confirms a significant relationship, suggesting that well-being plays a crucial role in influencing engagement levels.

Table 3. Rasch Model Analysis Results

Variables	Measure (logit)			Welch-2sided Rasch (< 0.05)	Differences
	All	High	Low		
Sustainable HRM	1.67	2.68	1.04	0.000	Significant
Well-Being	1.67	2.78	1.05	0.000	Significant
AI Technology	1.67	2.68	1.04	0.000	Significant

Source: Primary Data, 2024

In the case of AI Technology, the measure is again 1.67 logit, with high and low group measures of 2.68 and 1.04. This too shows significance, reflected in the p-value of 0.000, indicating that engagement with AI technology has a notable impact.

The uniform logit measure of 1.67 across these three variables implies an interrelated effect on engagement levels. The higher group scores indicate a stronger positive association with engagement for individuals who experience greater levels of sustainable HRM practices, well-being, and AI technology integration. These findings highlight the importance of these factors in enhancing employee engagement, suggesting that organizations can leverage the significant differences identified to improve their engagement strategies.

4.3 Hypothesis Testing

This study aims to evaluate the relationship between sustainable human resource management (HRM), employee well-being, AI technology, and employee engagement among employees in Greater Jakarta, Indonesia.

Table 4. The Chi-Square Analysis Results

Variables	Chi-Square (< 0.05)	Results
There is a significant correlation between sustainable HRM and Employee Engagement	0.000	H1 Supported
There is a significant correlation between well-being and employee engagement	0.000	H2 Supported
There is a significant correlation between AI technology and employee engagement	0.000	H3 Supported

Source: Authors, 2024

The results from the chi-square tests indicate a significant positive correlation between sustainable HRM and employee engagement (H1), with a reported p-value of 0.000, well below the significance threshold of 0.05. This finding supports H1 and aligns with previous research, further validating the established findings of [12] and [10], highlighting the relationship between sustainable HRM and employee engagement.

For well-being and employee engagement (H2), the p-value is also 0.000, indicating a significant positive correlation between employee well-being and engagement at work. This finding leads to the acceptance of H2. The results contribute to the growing body of evidence supporting earlier studies by [13] and [14] regarding the relationship between well-being and employee engagement.

Lastly, concerning AI Technology and employee engagement (H3), the p-value is again 0.000, indicating a significant positive correlation. Thus, H3 is accepted as well. This research aligns with earlier studies by [21] and [19], reinforcing the existing body of knowledge in the field of human-computer interaction, particularly regarding the relationship between AI technology and employee engagement.

4.4 Discussion

The theoretical implications of these findings are significant, contributing to the advancement of literature on employee engagement by linking it to sustainable HRM practices, well-being, and AI technology.

The relationship between sustainable HRM and employee engagement enriches the body of research that integrates sustainability into organizational behavior theories. Traditional HRM models have primarily focused on performance management, but these results indicate that sustainable practices, which emphasize long-term employee well-being and social responsibility, are essential for fostering engagement. This supports a shift toward viewing sustainability as a core component of HRM theory, challenging older models that may have overlooked environmental and social factors. By directly linking sustainability to engagement, this finding broadens the theoretical scope of HRM, suggesting that employee engagement is influenced not only by internal policies or incentives but also by the organization's ethical and sustainable practices.

The strong correlation between well-being and employee engagement reinforces the notion that well-being serves as a fundamental mechanism in engagement models. This validation aligns with theories such as self-determination theory (SDT), which asserts that when psychological needs like autonomy, competence, and relatedness are met, individuals are more likely to be engaged in their work. By positioning well-being as a central factor, the findings extend existing engagement theories, emphasizing the importance of incorporating well-being not just as an outcome but as a core driver of engagement. This approach offers a more holistic understanding of engagement, reflecting the increasing focus on mental health and well-being in organizational studies.

Moreover, the significant link between AI technology and employee engagement introduces AI as a new dimension in engagement theories. While traditional models have primarily addressed psychological and social factors, these results indicate that technology, particularly AI, can facilitate engagement by enhancing decision-making, reducing workload, and creating opportunities for learning and collaboration. This finding challenges conventional theories that have limited their focus on the role of technology in engagement. It contributes to the emerging discourse on AI and human-technology interactions, positing that AI is not merely a tool but a critical factor influencing engagement. Theoretically, this necessitates updated models considering the technological environment as a significant element shaping employee behavior and engagement.

Combining these three factors—sustainable HRM, well-being, and AI technology—supports a more integrated approach to understanding employee engagement. This suggests that engagement cannot be fully explained by focusing on isolated aspects of the work environment. Instead, a unified framework incorporating organizational practices (sustainability), personal well-being, and technological integration offers a more comprehensive explanation of what drives employee engagement. The findings advocate for the development of multidimensional engagement models that integrate social, psychological, and technological factors, pushing engagement theory beyond traditional psychological frameworks and proposing a more systemic view where engagement results from the interplay of various organizational and technological elements.

The practical implications of these results are vital for organizations seeking to enhance employee engagement. Each finding offers specific applications that can drive positive

outcomes.

The significant relationship between sustainable HRM and employee engagement indicates that organizations adopting sustainable HRM practices will likely experience higher levels of employee engagement. Sustainable HRM emphasizes fair treatment, employee development, and environmentally responsible policies. To implement this, organizations should invest in long-term development programs that promote growth and align with sustainable practices. Implementing policies that prioritize fairness, diversity, and inclusivity in the workplace is essential. Additionally, incorporating sustainability into the company's mission can motivate employees to engage with its goals and values, ultimately improving engagement and retention. Employees who perceive their company as responsible and future-oriented are more likely to feel committed and engaged, resulting in increased productivity and reduced turnover.

Well-being is crucial in influencing employee engagement, suggesting that organizations prioritizing employee well-being will cultivate a more engaged workforce. Well-being encompasses mental and physical health and a supportive work-life balance. To support this, organizations can establish well-being programs that address various aspects of health, including gym memberships, stress management workshops, and mental health days. Fostering a work-life balance through flexible work hours, remote options, and time off for personal well-being is also vital. Cultivating a supportive culture where leaders and managers demonstrate care for employees can significantly enhance engagement. Healthier and happier employees tend to be more engaged, resulting in higher job satisfaction, productivity, and organizational commitment.

The integration of AI technology positively impacts employee engagement by streamlining tasks, enhancing decision-making, and improving overall work efficiency. However, it is essential to integrate AI to support employees rather than replace human roles. Organizations can automate repetitive tasks, allowing employees to focus on more meaningful and creative work. Implementing AI tools that provide data-driven insights will aid employees in making informed decisions. Providing proper training on using AI tools is crucial, emphasizing AI's role as a support system. When integrated effectively, AI technology can reduce workloads and create more meaningful work experiences, increasing employee engagement and satisfaction. A thoughtful integration of AI fosters a more innovative and forward-thinking work environment.

Recognizing that employee engagement is multi-dimensional, organizations should adopt a holistic strategy encompassing sustainable HRM, well-being, and AI technology. This approach ensures that HR practices align with broader sustainability goals while addressing employees' professional development and well-being. Thoughtful integration of AI should enhance the employee experience rather than detract from it. Continuously measuring engagement through employee feedback, surveys, and data analytics is essential for tracking the impact of these practices and adjusting strategies as necessary.

5 Conclusion and Limitations

This study explores the interrelationship of Sustainable Human Resource Management, employees' well-being, and Artificial Intelligence on motivating employee engagement from Greater Jakarta, Indonesia organisations. The findings show that sustainable HRM practices are significantly positively correlated with employee engagement, thereby making it relevant for embedding sustainability into the framework of HRM. A focus on the well-being of employees and enabling organizational policies will lead to increased engagement, which again will contribute to productivity and better retention rates.

The research also established that well-being is an active mediator in the engagement process. Employees who perceive their organization as committed to their welfare will be more likely to demonstrate higher levels of engagement, which corroborates the assertion from the self-determination theory that the satisfaction of psychological needs promotes engagement. Meanwhile, the integration of AI technology proved to be another important determinant of engagement, which pointed to the fact that organizations using AI to support employees instead of replacing them can increase job satisfaction and general engagement. These findings add to the literature by proposing a multidimensional employee engagement model related to sustainable practices, well-being, and technological integration. This holistic approach will provide an organizational strategy to advance employee experiences for long-term organizational outcomes.

Even though a great insight was obtained, several study limitations need to be mentioned. While the research has availed a cross-sectional design, it can only include data at one point in time and might not represent the dynamic nature of employee engagement and well-being over time. Longitudinal studies are recommended for an in-depth prognosis of these relationships. The current study has its own limitations, such as using a convenience sample, which is practical yet might reduce generalizability to the workforce in Indonesia. Future studies would use a better sampling technique to enhance the study's external validity.

However, reliance on self-report measures of employee engagement, well-being, and perceived sustainable HRM practices may cause biases because participants could provide responses in a socially desirable manner. The inclusion of objective measures and/or third-party ratings provides the potential to address this limitation. Last but not least, though this research has focused on organizations in the Greater Jakarta area, regional differences and cultural backgrounds should also be considered in further research. This would yield more important insights into these dynamics within various geographic regions and industries: the complex interactions among sustainable HRM, AI, and employee engagement.

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Authors' Contributions and Data Availability

MGH lead the research, overseeing conceptualization, methodology, software, writing (including the original draft preparation), and final review. **KI** prepare the literature review and discussion and are responsible for writing, proofreading, and editing. **MGH and KI** handle data collection, prepare the literature review, and are responsible for writing, proofreading, and editing.

Data availability https://docs.google.com/spreadsheets/d/16iR4ykeiCJFJKR_qFZftljkek9DZiCA-/edit?usp=sharing&ouid=103333082160155599462&rtpof=true&sd=true

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