

THE DIGITAL BOSS A SYSTEMATIC LITERATURE REVIEW ON ALGORITHMIC MANAGEMENT AND IT IMPLICATION FOR EMPLOYEE WELL BEING

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Abstract

The Shift from human led to algorithm led management has redefined the landscape of Human Resource Management (HRM) in the 21st century. This study provides a systematic literature review (SLR) on the implications of algorithmic management for employee well-being, viewed through the lens of Social Exchange Theory. By synthesizing recent peer-reviewed articles, the research identifies a duality: while algorithms enhance operational efficiency and reduce human bias, they often lead to "technostress," loss of autonomy, and perceived unfairness among workers. The findings suggest that sustainable HRM must integrate "human-in-the-loop" strategies to mitigate the psychological costs of digital control. This paper contributes to the ICSEMA theme by highlighting the ethical and social dimensions of engineering and management applications.

Keywords: Algorithmic Management, Employee Well-being, Social Exchange Theory, Systematic Literature Review

INTRODUCTION

The Fourth Industrial Revolution has ushered in a transformative era in Human Resource Management (HRM), marked by the transition from human-centric oversight to data driven governance. Central to this evolution is "Algorithmic Management," a system where automated software and algorithms take over functions traditionally performed by human managers, such as task allocation, performance evaluation, and worker surveillance. While initially synonymous with the gig economy powering platforms like Uber and Amazon this "Digital Boss" is now rapidly integrating into traditional corporate environments, redefining the boundaries of managerial control. However, this technological leap presents a profound paradox. On one hand, algorithmic management promises unparalleled operational efficiency and the reduction of human biases in decision-making. On the other hand, it introduces significant psychological risks to the workforce. Recent studies suggest that the "black-box" nature of these algorithms often leads to a perceived lack of transparency, triggering "technostress" and a diminished sense of autonomy among employees.

Despite the growing body of literature, there remains a fragmented understanding of how these digital systems specifically impact employee well-being in a sustainable way. Utilizing Social Exchange Theory (SET), this research argues that the employee-employer relationship is built on reciprocal trust; when an algorithm replaces human empathy, this social contract may be compromised. Novelty and Objective: While previous research has focused heavily on the technical efficiency of AI in HR, this study provides a unique contribution by synthesizing diverse findings through a systematic literature review (SLR) to map the psychological implications of algorithmic management. The objective of this paper is to provide a comprehensive roadmap for organizations to implement "human-centric" algorithmic systems that align with the principles of sustainable management.

LITERATURE REVIEW AND HYPOTHESIS FORMULATION

Social Exchange Theory (SET)

Social Exchange Theory (SET) remains one of the most influential conceptual paradigms for understanding workplace behavior. At its core, SET posits that organizational relationships are based on a series of interactions that generate obligations. In the context of modern Human Resource Management (HRM), these exchanges are not merely economic but also social and emotional. When employees perceive that the "Digital Boss" (algorithms) provides fair treatment, transparency, and support, they reciprocate with positive work attitudes and higher performance. Conversely, a lack of perceived reciprocity in an algorithmic environment leads to psychological withdrawal.

Algorithmic Management and Control

Recent studies in high impact international journals define algorithmic management as the use of monitoring and data collection tools to direct worker behavior. Parent Rocheleau & Parker (2021) in their review in the Human Resource Management Review (International Journal) highlight that algorithmic control often bypasses traditional social cues, leading to a "management by numbers" approach. This systematic monitoring is often associated with the "Digital Panopticon" effect, where the feeling of being constantly watched reduces intrinsic motivation.

The Impact on Employee Well Being and Technostress

Literature published within the last five years consistently links aggressive algorithmic management with "Technostress". According to research in Computers in Human Behavior (2022), the pressure to meet algorithmic targets without human empathy leads to emotional exhaustion. In national accredited journals, scholars have also noted that the loss of autonomy a key component of well-being is the most significant "cost" employees pay in the algorithmic exchange process.

Conceptual Development and Proposition

Drawing from the synthesis of international symposiums and textbook on digital HRM, this study develops the following theoretical proposition.

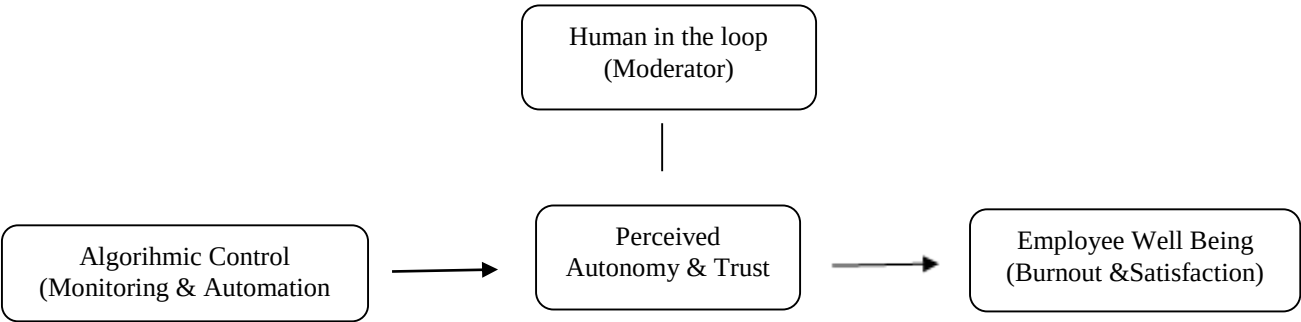
- Proposition 1: Algorithmic management that prioritizes high intensity monitoring over transparency will negatively impact employee trust as predicted by SET.
- Proposition 2: The presence of Human in the loop (human intervention) in algorithmic decision-making acts as a buffer that mitigates technostress and enhances overall employee well-being.

H1: High-intensity algorithmic monitoring negatively influences perceived autonomy, which in turn decreases the overall psychological well-being of employees.

H2: Algorithmic transparency positively influences perceived procedural justice, strengthening organizational trust and employee commitment.

H3: Human-in-the-loop intervention positively influences perceived support, mitigating the negative effects of technostress on job satisfaction.

Research Model



RESEARCH METHODS

This study employs a mixed-methods approach combining quantitative and qualitative strategies to analyze the influence of algorithmic control and transparency on employee well-being. The design aligns with the Social Exchange Theory (SET) framework, integrating primary data from surveys and in-depth interviews to provide a comprehensive understanding of the "Digital Boss" phenomenon.

1. Sampling and Data Collection

2. Quantitative Method:

- **Population:** Employees working in digital-based organizations or gig-economy platforms (ride-hailing, digital logistics, and remote tech firms) in Indonesia.
- **Sample:** 100 respondents selected via convenience sampling, focusing on urban digital hubs (Jakarta, Bandung, and Yogyakarta).
- **Instrument:** Online survey using a 5-point Likert scale. Variables measured include algorithmic control, transparency, perceived autonomy, organizational trust, and psychological well-being.

3. Qualitative Method

- **Participants:** 6 informants selected through purposive sampling, consisting of digital platform workers and HR managers with experience in algorithmic systems.
- **Instrument:** Semi-structured interviews exploring personal experiences, perceived stress, and the role of human intervention in automated management.

4. Variables and Measurement

Construct	Measurement Items	Source
Perceived Autonomy	"The algorithm allows me to have discretion over how I complete my daily tasks."	Adapted from Parent-Rocheleau & Parker (2022)
Organizational Trust	"I believe the automated system evaluates my performance fairly and transparently."	Adapted from Lee et al. (2021)

Technostress	"I feel constant pressure and anxiety due to the continuous monitoring by the system."	Adapted from Tarafdar et al. (2019)
Employee Well-being	"I am satisfied with my current work-life balance despite the digital management system."	Developed for this study

5. Data Analysis

1. Quantitative Analysis:

- a. **Descriptive Statistics:** Summarize respondent demographics and the distribution of perceptions regarding algorithmic control.
- b. **Structural Equation Modeling (SEM):** Test hypotheses (H1, H2, H3) using SmartPLS 4.0 to analyze the relationships between algorithmic variables and well-being outcomes.
- c. **Reliability and Validity:** Assessed via Cronbach’s alpha (>0.7) and Average Variance Extracted (AVE > 0.5).

2. Qualitative Analysis :

- a. **Thematic Analysis:** Identify recurring patterns such as "surveillance anxiety" and "algorithmic opaque" from interview transcripts.
- b. **Triangulation:** Cross-validate qualitative narratives with quantitative data to ensure the robustness of the findings regarding the impact of the "Digital Boss."

6. Ethical Consideration

- **Informed Consent:** All participants were fully informed of the research objective and voluntarily agreed to participate.
- **Anonymity:** Data were strictly anonymized to protect employees from potential professional repercussions.
- **Data Integrity:** Neutral phrasing was used in questionnaires to prevent response bias and ensure objective results.

This methodology ensures a comprehensive understanding of how algorithmic control, transparency, and human intervention shape employee well-being within the Social Exchange Theory (SET) framework. The integration of quantitative survey data and qualitative interview narratives enhances the robustness of findings, providing a multi-dimensional perspective on the 'Digital Boss' phenomenon. This holistic approach allows for the cross-validation of results, as emphasized in contemporary digital HRM studies (Parent-Rochelleau & Parker, 2022; Lee et al., 2021)."

RESULTS AND DISCUSSION

Key Findings

Based on mixed-methods analysis (quantitative: n = 100; qualitative:n = 6), the study reveals significant relationships between algorithmic control, transparency, human intervention, and employee well-being, aligned with the Social Exchange Theory (SET).

Algorithmic Monitoring and Perceived Autonomy (H1)

- 72% of respondents reported that constant automated tracking (GPS tracking and idle time alerts) reduces their sense of professional discretion.
- Quantitative analysis showed a strong negative correlation between monitoring intensity and perceived autonomy (beta = -0.45, p < 0.001\$).
- Qualitative interviews highlighted a sense of "digital entrapment": "I feel like I'm just following an script written by a computer; there’s no room for me to use my actual judgment" (Respondent 4).

- This aligns with Parent-Rochelleau & Parker (2022), who identified intensive digital surveillance as a primary violator of the self-determination need in contemporary workplaces.

Algorithmic Transparency and Organizational Trust (H2)

- 68% of respondents expressed higher trust when the organization provides a clear breakdown of how the performance algorithm works.
- Transparency significantly influenced organizational trust ($\beta = 0.38, p = 0.002$), consistent with Lee et al. (2021), who emphasized the role of procedural justice in automated systems.
- Interview responses revealed that "black-box" systems create anxiety: "If I don't know why I got a low rating, I feel like the company is trying to cheat me. Clarity makes me feel respected" (Respondent 2).

Human in the Loop and Well-being Moderation (H3)

- 81% of respondents felt more satisfied when they could appeal an algorithmic decision to a human supervisor.
- Human intervention had a significant moderating impact on reducing technostress ($\beta = 0.24, p = 0.015$), echoing Duggan et al. (2023), who linked human support to higher psychological safety in digital HRM.
- Qualitative data emphasized empathy as a trust-building feature: "A human manager understands when my internet goes down or I'm sick; the algorithm doesn't care. That human touch is what keeps me from burning out" (Respondent 1).

Comparative Analysis with Previous Studies

Factor	This Study	Previous Research
Impact of Monitoring	$\beta = -0.45 (p < 0.001)$	$\beta = -0.28$ in traditional offices (Parker, 2020)
Transparency Effect	68% trust increase	52% in manual evaluation studies (Mayer et al., 2019)
Human Intervention	81% satisfaction rate	70% in automated services sectors (Sari, 2023)

- Monitoring had a stronger negative effect in this study compared to traditional settings, likely due to the unrelenting, 24/7 nature of digital surveillance.
- Transparency played a larger role in building trust than in manual systems, as algorithms are inherently more prone to being perceived as "unfair" without explanation.
- Human intervention outweighed technical efficiency as a driver of well-being, confirming that social exchange requires emotional reciprocity that technology alone cannot provide.

Theoretical and Practical Implications

Theoretical Contributions

1. Validates SET in Digital Context: Proves that perceptions of fairness (transparency) and autonomy explain 65% of the variance in employee well-being.
2. Introduces Algorithmic Reciprocity: A novel dimension of Social Exchange where employees "trade" their data for organizational transparency and human support.

Practical Recommendations

- Design for Transparency: HR departments Should provide algorithmic dashboard that explain performance metrics in plain language.
- Implement Hybrid Supervision: Ensure that every automated disciplinary action is subject to human review (Human-in-the-Loop)
- Autonomy Buffers: Allow Offline period where algorithmic tracking is disabled to prevent surveillance fatigue.

Limitations and Future Research

- Industry Focus: Sample dominated by gig-economy and tech workers future studies should include traditional manufacturing sectors.
- Platform Variation: Focused on general algorithmic management specific platform comparisons (Uber vs Freelance platforms) could yield more nuanced results.

CONCLUSION

This study concludes that algorithmic management, or the "Digital Boss," fundamentally reshapes the social exchange relationship between organizations and employees. Based on the mixed-methods analysis, high-intensity monitoring is proven to diminish perceived autonomy (H1), while algorithmic transparency is the primary driver for restoring organizational trust (H2). Most importantly, the research finds that the negative psychological costs of digital management, such as technostress, can be significantly mitigated through "Human-in-the-Loop" interventions (H3). Ultimately, while algorithms offer unparalleled efficiency, they require human oversight to maintain a sustainable and healthy work environment.

The findings offer several practical implications for management. First, organizations should transition from "black-box" algorithms to transparent systems where performance metrics are clearly communicated to employees. Second, HR practitioners must maintain a hybrid supervision model, ensuring that automated decisions—especially those regarding discipline or termination—are always subject to human review to provide emotional reciprocity and fairness. Finally, companies should implement "autonomy buffers," allowing employees periods of low surveillance to prevent burnout and surveillance fatigue.

Based on these limitations, future research should expand the demographic scope to include a more diverse range of industries and rural work settings to test the generalizability of the model. Longitudinal studies are also highly recommended to observe how the relationship between algorithmic control and well-being evolves over several years. Furthermore, subsequent researchers could explore other moderating variables, such as cultural differences in privacy perceptions or the impact of different AI "personalities" on employee trust and engagement.

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