

INCREASING DEPLOYMENT OF AI/AM: IS IT POSSIBLE TO BALANCE TECHNO AND HUMAN CENTRIC APPROACHES?

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<https://doi.org/10.47833/2025.1.ECO.005>

Keywords:

Artificial Intelligence (AI)
Algorithmic Management (AM)
Workplace Efficiency
Employee Well-Being
Human-Centric Design

Article history:

Received 31 October 2024
Revised 5 February 2025
Accepted 7 February 2025

Abstract

The rapid deployment of Artificial Intelligence (AI) across various industries has sparked a debate on balancing technological advancements with human-centric approaches. This paper explores the dual impact of AI and Algorithmic Management (AM) on workplace efficiency and employee well-being. While AI enhances productivity and operational accuracy through automation and data-driven decision-making, Through case studies and real-world examples, this study explores ways to integrate AI that respect human values and ethics. The findings highlight the importance of striking a balance between embracing technological innovation and ensuring the well-being of workers for a sustainable and responsible use of AI.

1 Introduction

Algorithms have significantly transformed markets and businesses, evolving from technical jargon to a subject of public debate, with contrasting views on the productivity versus human well-being. The integration of AI and Algorithmic Management (AM) has fundamentally altered workplace dynamics, creating both efficiency gains and ethical concerns regarding privacy and employee autonomy. Artificial Intelligence (AI)/Algorithmic Management (AM) systems now automate tasks traditionally handled by managers, a trend accelerated by the COVID-19 impacting both online labor markets and traditional conventional workplaces. This digital transformation affects employment quantity, job and occupational structure and skills demand, often disrupting traditional employment relations and lacking transparency.

The algorithms have changed how markets and businesses function over the past few decades. The term “algorithm” has shifted from a technical term used by computer scientists to one associated with divisive debate. Corporate attempts to “brand” the term emphasize the superiority of algorithmic objectivity over subjective human judgment (Sandvig, 2015). However, large organizations have long had internal policies that those under their control do not fully understand which can be referred to as

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“algorithms.” The broader implications of AM include disruptions to traditional employment relationships, particularly in terms of collective bargaining and workers' rights. The datafication of work, enabled by AI and Big Data technologies, allows employers to gather and analyze vast amounts of information on employee performance and behavior, which can influence job security and workplace dynamics. As more organizations adopt algorithmic systems, understanding their socio-technical implications becomes critical

The widespread use of data collection technologies and techniques, the expansion of personal data archives, and the increasing adoption of mobile devices and services have led to significant changes. These changes are not directly related to the algorithms that process the data but focus on the data's composition, emerging privacy concerns, and the potential—or impossibility—of opting out. Algorithmic automation is expanding into previously white-collar work, such as credit evaluations (Straka, 2000).

Fast growth of the platform labour thanks to the advancements in AI, and the changing socio-economic landscape, especially following the COVID-19 have exacerbated existing challenges. Among many challenges, it is worth to mention the growing share of Non-Standard Employment Relations (Non-SER) or precarious employment at the expense of the Standard Employment Relations providing full-time employment at the single employer. (Warhurst and Knox, 2022: 306)

The article has five main sections. Following the introduction, the second briefly reviews the concepts of AI & AM. The third one outlines the impact of AM in the workplace and the need for more balanced deployment of AI/AM to respect both productivity potential and augmenting worker's position. The fourth and fifth sections explain the future roles of such concepts as “social-technical system” and “Industry 5.0”. Both intend to call attention to the shift from narrow techno to the human-centric approaches in the fast digitalization of work. Finally, the last section summarizes the discussion and outlines the future research challenges.

2 Understanding the key technological concepts: The example of the AM

AI and AM are transforming industries by automating tasks and optimizing decision-making. AI, using techniques like machine learning and natural language processing, enhances productivity and accuracy across various fields (Hosny et al., 2018).

AM employs algorithms to manage work processes and employee performance, common in both in platform and traditional economies, improving efficiency but raising concerns about worker autonomy and bias (Puranam, 2018). Together, they offer innovation and efficiency while posing challenges in fairness and accountability

The digitization of workplaces, including both traditional settings and digital labor platforms, is revolutionizing data collection, processing, and sharing. The European Commission's Joint Research Centre (JRC) notes that this digital transformation makes algorithmic control essential for managing the vast data generated by digitized economic activities. However, such management techniques are still under-researched in traditional workplaces, unlike their more frequently surveyed practice of the digital labor platforms (Baiocco, S., E. Fernández-Macías, U. Ran and A. Pesole, 2022).

AI-powered algorithms are being employed exponentially to evaluate, forecast, and make judgments based on vast amounts of data. AM systems can now automate tasks that were once handled by human managers, such as performance appraisal, data processing, and suggestion. These systems are becoming more important in the business community and emerging their use in the public sector too (Brynjolfsson & McAfee, 2016; Faraj et al., 2018; Schwab, 2016; Wang & Siau, 2019). To better understand the role of AM in shaping physical working conditions, income, labour safety in the sector of the fast-growing platform work, it is necessary to call attention to the emblematic work of Mateescu and Nguyen (2019:3) who identified the following key characteristics of AM:

- Prolific data collection and surveillance of workers through technology.
- Real-time responsiveness to data that informs management decisions.
- Automated or semi-automated decision-making.
- Transfer of performance evaluations to rating systems or other metrics.
- The use of “nudges” and penalties to indirectly incentivize worker’s behaviour.

Potocka-Sionek and Aloisi also quote this definition, but the authors adopt a more general one which is easier to apply to traditional workplaces: “AM is defined here as the use of software to automate organizational functions traditionally carried out by human managers” (Potocka-Sionek and Aloisi, 2024:2).

3 AM in Practice need to compromise between efficiency and well-being of workers

The previous waves of technical advancement have improved working conditions and health and safety. Growing research shows that, when applied ethically, intelligence-led changes can positively affect the workplace. In logistics systems, voice command software has become standard, used in the warehouses of Lidl, Aldi, and Amazon. Zero error margins and enhanced efficiency are promised by its designers. However, AM based on the extreme simplification of work dehumanizes employees. Technological advancements have eliminated certain hazardous and dehumanizing jobs, with robots now used in dangerous areas. The “internet of things” and automated technologies can enhance workplace safety by delivering better preventative measures, fewer injuries, and more creative potential from humans. AI and robotics can help to reduce unpleasant and repetitive tasks chores that lead to musculoskeletal problems and mental health risks.

Simultaneously, while AI and AM can streamline tasks and reduce certain risks, they also introduce new stresses related to surveillance and algorithm-driven decision-making, potentially affecting employee well-being. Many competitive companies espouse the motto, “Our people are our most important asset.” However, “the people” have not appeared to be at the center of tech companies’ strategic agendas when addressing the revolutionary impact of technology in the workplace. Making money has continued to come first, putting labor last. This must end. In these situations, staff over-performance and a production-first mentality take precedence over workplace safety.

According to many pundits and even scholars’ intelligence AI and AM are transforming workplaces to boost unprecedented productivity growth. For example, Goldman Sachs predicts a 7% global GDP will be boost by the generative AI over the next decade (Acemoglu, 2024). AI’s ability to semi-automate decision-making, such as in “people analytics” in HR management, can enhance recruitment, employee performance evaluation, and operational management (Glynn, 2018; Hosny

et al., 2018). However, alongside the benefits, AI and AM raise concerns about worker safety, well-being, and transparency. Studies have shown that workplaces with increased automation, such as Amazon's robotic warehouses, experience higher rates of work-related injuries due to the increased pressure on workers (Kantrowitz, 2020). Additionally, the opaque nature of AI-driven decisions can frustrate employees, as algorithms often operate without clear explanations or transparency (Boyle, 2018).

AI systems can optimize coordination and task management, streamlining processes such as inventory and customer service management, leading to reduced labor costs and increased financial efficiency (Russakovsky et al., 2015). However, these systems also act as tools of surveillance, as employees may feel disconnected from decision-making processes and face challenges adapting to the new, data-driven work environment (Nikolaidis & Shah, 2012). While AI and AM offer significant benefits in terms of efficiency and organizational learning, they also pose risks to employee autonomy, safety, and transparency. As AI continues to shape the future of work, companies must address these challenges to ensure a fair and sustainable work environment.

The systematic and reliable empirical evidence indicate that the „total factor productivity” (TFP) grows by only 0.66 % annually. As Acemogly, the recent Nobel price laureate noticed these figures are much more modest in comparison with Goldman Sachs and others pundits' prediction. He stresses: „The good news is that, compared to earlier waves of automation – such as these based on robot or software systems – the effects of AI may be more broadly distributed across demographic groups... not have as extensive an impact on inequality as earlier automation technique did” (Acemoglu, 2024:2).

4 Comparing Corporate Strategies and Workforce Impacts of AI/AM Integration

The adoption of AI and algorithmic management (AI/AM) solutions has had diverse impacts on employee dynamics, with fluctuations in retention and turnover influenced by factors such as reduced autonomy, increased workloads, and challenges to work-life balance. While AI systems can automate tasks like personnel control, performance monitoring, and dismissal processes, their full implementation remains limited by regulatory constraints like the GDPR. Companies have approached these challenges differently: Amazon employs AI-driven systems to optimize operations, enhancing efficiency but facing concerns over worker surveillance and high turnover due to demanding conditions. In contrast, Google integrates AI to enhance productivity while prioritizing employee well-being, using tools that manage workloads and reduce stress, leading to higher employee satisfaction and retention.

5 From Techno-Centric to Human-Focused: The Shift to Industry 5.0

AM represents changes from traditional (hierarchical) forms of workplace control, offering employers unprecedented precision and efficiency through data-driven systems. AM is characterized by its comprehensiveness, instantaneous feedback, and often opaque decision-making processes (Faraj et al., 2018; Rahman, 2019). The rise of AM has sparked concerns about worker privacy, autonomy, and accountability, particularly as human managers are increasingly replaced by automated systems (Lindebaum et al., 2020). Despite its benefits, such as increased efficiency, AM's

opacity can frustrate employees, leaving them uncertain about how decisions are made and how to contest them (Bernstein & Li, 2017). This frustration is exacerbated when algorithms drive decisions that workers cannot easily understand or challenge, as seen in sectors like retail and logistics (Bumbulsky, 2013; Danaher, 2016).

The shift from Industry 4.0 to Industry 5.0 is supported by the EU policy documents. This new approach recognises the power of industry to achieve societal goals beyond jobs and growth, to become a resilient provider of prosperity, by making production respect the boundaries of our planet and placing the wellbeing of the industry worker at the centre of the production process. It complements the existing "Industry 4.0" paradigm by having research and innovation drive the transition to a sustainable, human-centric and resilient European industry. It moves focus from solely shareholder value to stakeholder value, for all concerned." (Cotta, J., Breque, M., De Nul, L., Retrides, A. 2021:3).

6 Discussion and future research challenges

Algorithmic management involves the design, implementation, and continuous oversight of algorithms. These algorithms are pivotal in shaping AI systems, influencing how they make decisions, learn from data, and evolve. Effective AM must address not only technical aspects like optimization and monitoring but also ensure fairness, transparency, and accountability in its use. Ethical concerns are central to AM, particularly around preventing biases and ensuring responsible deployment. Regulatory frameworks are essential to guide the development and ensure compliance with ethical standards.

Future research should focus on developing and especially monitoring the AI/AM systems in order to balance technical efficiency with ethical oversight. Key challenges include preventing algorithmic biases, ensuring transparency, and enhancing collaborative approaches among technology developers, businesses, governments, and the public.

EU and national level regulations (e.g. legal, social) play crucial role in developing and monitoring transparency and inclusiveness of the AM both in labour platforms and traditional workplace. The recent EU platform work Directives (EU Parliament Decision (24th April, 2024) require further empirical evidences. In this perspective, the authors intend to survey such food-delivery platforms like Wolt and Foodora operating in Budapest and Berlin. This comparative approach may help to identify important role of the national institutions (e.g. Industrial Relations System –IRS) shaping the use of AM and avoid the bias created by the “institutional vacuum” approach, situations where established institutions—such as laws or regulations—are lacking, underdeveloped, or ineffective at guiding behavior. This absence often results in the creation of informal norms, practices, or improvised rules to address the gap left by missing formal frameworks. In this relation especially important to pronounce the "Article 10: Human oversight & Article 11: Human review" in the EU Directives, which are calling attention to the need of monitoring AM practice effecting income, performance assessment, mental and physical health of the platform workers.

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