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Artificial Intelligence

The Importance of Human Capital When Collaborating With AI

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A look at human–AI teaming in non-office, blue-collar work, clarifying complementarity vs substitution.

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The World Economic Forum's Future of Jobs Report 2025 projects that workforce disruption over 2025–2030 will be substantial, equating to 22% of jobs by 2030, with 170 million new roles created and 92 million displaced (a net gain of 78 million), based on a survey of over 1,000 large employers spanning 22 industries and 55 economies.[1] While generative AI may replace certain white-collar roles, blue-collar non-office jobs (especially those requiring physical dexterity and mobility, judgment, and real-time decision-making) are more likely to be augmented by AI for workflow optimization and productivity enhancement, rather than fully replaced. As a result, it is integral to understand the relationship between human resources such as experience and skills and AI when it comes to improvement in quality and performance of the workers. An experiment involving Instacart shoppers demonstrates that prescriptive AI can increase productivity and flexibility for non-office workers, enhancing item-picking rates by 5.53% and broadening job experience, with a 32.5% increase in workers operating across multiple stores. On a separate note, our research finds that AI can bridge skill gaps without fully replacing workers' experience.

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Introduction

The World Economic Forum's Future of Jobs Report 2025 estimates that AI and related technologies could affect nearly 22% of jobs worldwide over the next five years, with 170 million new roles created and 92 million displaced across 22 industries and 55 economies.[1] This transformation spans both traditional office roles and blue-collar, non-office jobs, signaling substantial change in work environments, task requirements, and skill demands across diverse sectors. While generative AI tools like ChatGPT are transforming knowledge work in fields such as software development, consulting, research, education, marketing, financial analysis, and law—traditionally associated with white-collar, office-based roles—emerging predictive and prescriptive AI technologies hold the potential to dramatically reshape the routines of blue-collar, non-office workers. This includes tasks such as item picking and sorting in stores and warehouses, driving and delivery services, construction, maintenance and repair, manufacturing and assembly line work, logistics and material handling, and even agricultural labor. While AI is poised to significantly transform how these jobs are carried out, its most immediate and impactful role in the foreseeable future will be in augmenting human capabilities rather than replacing workers. AI might reshape the way tasks are performed by potentially enhancing efficiency, decision-making, and productivity, but human involvement will remain essential in many aspects of these roles.

Intricate Relationship Between AI and Human Capital

As a result, companies adopting AI tools must understand how AI's impact on productivity and work quality varies based on human resources such as experience and skills as well as contextual factors such as task complexity, workload, etc. First of all, it is hard to say ex ante how AI influences the value of human worker experience. AI can devalue human experience in several areas: for example, it can analyze large datasets and identify

patterns beyond human reach, reducing reliance on a radiologist's expertise;[2] automate data entry and reporting, lowering the need for experienced oversight; handle routine customer inquiries through chatbots, minimizing the importance of service experience; and perform translation tasks quickly and accurately, reducing the value of human expertise, particularly in routine cases. In contrast, AI can complement human experience, creating a synergy between technology and human insights. While AI excels in data-driven optimization, human workers might bring unique, context-specific knowledge and "common sense" that AI lacks. This blend of AI's analytical strengths and human intuition might enable more effective, nuanced decision-making, highlighting the potential for AI and human expertise to enhance each other.

Although the relationship between AI and human experience can be complex and is not yet fully understood theoretically, companies must consider it in their operational strategies, particularly to ensure effective adoption of AI where worker experience varies. Tailoring AI implementation based on worker experience levels may be crucial, as companies can optimize when and how AI tools are introduced depending on whether AI is more of a substitute or a complement to human experience. If AI is primarily substitutive, immediate integration may be most effective. However, if AI complements human expertise, a phased approach may be better, allowing workers time to build foundational experience before collaborating with AI to maximize productivity.

The impact of AI on productivity and service quality might be shaped not only by worker experience but also by other human capital factors, like skill level, and contextual factors, such as task complexity. It is unclear whether AI primarily benefits higher-skilled workers by enhancing their abilities or if it helps lower-skilled workers more by filling gaps in expertise. This distinction is crucial: AI might either level the playing field, reducing performance variability and standardizing service quality, or widen the gap between top and bottom performers, leading to greater variation in responsiveness and quality of the service. Additionally, work environment factors, like task complexity and workload, may influence AI's effectiveness. For instance, AI might prove especially valuable in high-complexity tasks where its data-driven precision supports decision-making beyond human intuition. In high-workload scenarios, AI recommendations can reduce cognitive and physical stress, helping workers maintain quality without being overwhelmed.

AI Fosters Job Appeal or Causes Burnout and Increased Turnover?

Beyond productivity and service quality gains, the true impact of AI tools lies in their effect on workers' job satisfaction, motivation, and work dynamics. While companies and workers are captivated by AI's potential to optimize output, this technology can bring significant human costs. For one, AI could reduce opportunities for workplace social interaction, potentially leaving workers feeling less connected and emotionally engaged in their roles. This isolation can lead to burnout and increased turnover, even as tasks are completed faster and with greater accuracy. A recent study indicates that heavy reliance on digital technology may negatively impact human well-being, potentially affecting worker engagement and workload.[3] To mitigate these effects, adopting a human-centered approach to AI integration—one that prioritizes employee well-being alongside productivity gains—can be essential. On the positive side, AI might alleviate some of the more taxing and stressful aspects of work, thus making roles more enjoyable and manageable. This shift could enhance overall job satisfaction and potentially support positive work patterns and higher retention by reducing burnout and promoting a balanced work environment.

Bringing it all together, significant questions arise around how AI collaborations influence workers' task performance and work patterns, particularly considering human resources as the most critical asset. To explore these questions, in our recent study,[4] we conducted a large-scale field experiment on the Instacart platform. Our findings indicate that companies should consider the value of human capital when integrating AI-enabled technology, as it plays an essential role in shaping AI's impact on worker productivity and work patterns. Additionally, our results offer practical insights for tailoring AI access to meet the varied skills and experience levels within a diverse workforce.

An A/B Experiment

Our analysis is based on a field experiment conducted by Instacart (where one of us works) from June to September 2022, involving more than six thousand gig workers. The main goal of this experiment was to examine the impact of AI-enabled technology on increasing the proportion of items found by gig workers and enhancing service responsiveness. Importantly, this data enables us to estimate the causal effects of AI-enabled technology on gig worker performance for specific tasks while also revealing interesting trends in worker behavior and work patterns under the influence of this technology.

In this experiment, some workers were provided with an AI-powered map view that displayed the store layout, along with icons marking the approximate locations of the items they needed to pick. The map also featured an optimized green path, dynamically updated to reflect the worker's and items' location in real-time, and calculated by an algorithm addressing the traveling salesman problem (TSP). Built on a foundation of advanced deep learning, this technology leverages crowdsourced data, generates real-time optimal paths for item picking across various product categories, adapts to changes in item positions, and continually refines its guidance as it learns over time. This AI tool offered comprehensive decision support from the start to finish of the picking tasks. Conducted as an A/B test, the experiment allowed us to attribute any observed differences in performance and work patterns between the treatment and control groups specifically to the availability of this AI-enabled technology.

Impact of AI on Workers' Performance

First, our results reveal that AI can immediately boost efficiency and service quality, but rather than reducing the importance of human experience, it actually complements it. Thus, for companies aiming to maximize AI's benefits, it may be best to allow workers to develop domain expertise first, enhancing their ability to fully leverage AI tools. Skill level is another critical factor. While AI cannot replace experience, it can compensate for lower skill levels, which is particularly advantageous for less-skilled workers. This suggests companies could consider *more flexible hiring criteria with AI support in place*; however, even

less-skilled workers still need some level of experience to harness AI's full potential. These insights are particularly valuable for companies with a workforce varying widely in experience and skill levels.

One possible reason why more experienced workers may benefit more from AI than less experienced ones is their ability to integrate AI support with additional contextual insights and "common sense". Our study shows that less experienced workers are over ***five times*** more likely to rely heavily on AI compared to their more experienced colleagues. This *overreliance* can prevent them from adjusting AI recommendations when necessary, missing opportunities to optimize decisions based on real-world nuances, such as real-time in-store congestion or layout changes that AI alone may not fully capture. Conversely, experienced workers, by balancing AI guidance with their own judgement, are better positioned to leverage AI effectively, enhancing decision-making and overall performance.

Our research also highlights the crucial role companies play in strategically managing AI technology, especially for complex tasks and high workload scenarios. AI can enhance task efficiency and productivity in ways beyond human capability, particularly for tasks requiring precision and data optimization. AI's effectiveness in complex tasks and during high-volume workloads indicates its ability to boost human intelligence, particularly when managing large data sets or intricate variables, thereby easing cognitive overload, a concept thoroughly explored in social psychology.

Impact of AI on Work Pattern

Our findings show that AI adoption not only improves immediate performance for gig workers but also enhances their engagement and flexibility. Workers complete ***3.16% more*** tasks and pick ***5.53% more*** items daily with AI assistance. In a competitive labor market, this AI-driven boost in efficiency can enhance job satisfaction and foster employee loyalty by making the job more appealing and productive. AI also enhances worker flexibility by boosting the likelihood of shoppers working across multiple stores ***by 32.5%***, broadening their skill set and enriching their job experience. This adaptability not only broadens their skill set but also enriches their job experience which might lead to job satisfaction.

These findings suggest that AI not only helps workers perform tasks more efficiently but may also boost their engagement and participation in their work, indicating an increase in job satisfaction. One reason for this could be that AI alleviates the stress associated with complex item-picking tasks in stores, which can overwhelm workers. Without AI, workers might experience choice overload behavioral phenomena—facing numerous options without clear guidance on where to begin or which route to take. This lack of direction could lead to ongoing second-guessing, as workers may worry they are not following the optimal path to complete tasks. With AI providing structured guidance, however, workers can feel more confident and supported, likely enhancing both their performance and enjoyment of the job. Alternatively, AI enhancing worker flexibility might play integral role in improved satisfaction of workers and their willingness to perform more tasks. Research consistently shows that workplace flexibility empowers employees by helping them better meet their individual needs, ultimately boosting both engagement and retention.[5]

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Our findings suggest that companies should take a balanced approach in deploying AI by integrating it thoughtfully alongside worker experience, which remains essential for optimal results. While AI can help close skill gaps, it does not fully replace the depth of human experience. Thus, organizations benefit by investing in both worker development and AI integration, enabling workers to leverage AI effectively. Overall, combining AI's strengths with human expertise can lead to sustainable improvements in productivity and employee engagement.

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