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Research: How Gen AI Is Already Impacting the Labor Market

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Summary

Many have wondered about — and feared — the impact that gen AI will have on *labor markets*. Some compare it to past innovations, like robots, whose effects have been relatively modest, while others have forecasted that its impacts will be more long-ranging, given gen AI's fundamental ability to improve itself over time. New research analyzed over a million job posts for online gig workers to see what affect the introduction of tools like ChatGPT and image-generating AI have already had on the quantity of posts, job requirements, and pay of online workers — and which fields and professions have been the most impacted. The researchers offer insight into the challenges and potential opportunities of these shifting markets.

In the early 2000s, when Amazon introduced its Kiva robots to automate warehouse operations, employees feared for their jobs as machines began taking over tasks previously performed by humans. Today, advances in gen AI and natural language processing, such as ChatGPT, are transforming many

industries and raising similar concerns. However, unlike past automation technologies, gen AI has the unique potential to impact all job sectors, particularly given its fundamental ability to improve its capabilities over time — which promises to affect the workforce in ways that go beyond simple job replacement.

In [new research](#), forthcoming in *Management Science*, we explore the impact gen AI has already had on the labor market by examining trends in demand for online freelancers. Our findings show significant short-term job replacement after these tools were introduced, and that jobs prone to automation, like writing and coding, were the most affected by ChatGPT. Our research also examines how competition, job requirements, and employer willingness-to-pay have changed to better understand how the online job market is evolving with the rise of gen AI. Although still in its early stages, gen AI's impact on online labor markets is already becoming discernible, suggesting potential shifts in long-term labor market dynamics that could bring both challenges and opportunities.

The Impact of Gen AI on Online Labor Markets

The Job Replacement Effect

To conduct our study, we analyzed 1,388,711 job posts from a leading global online freelancing platform from July 2021 to July 2023. Online freelancing platforms provide a good setting for examining emerging trends due to the digital, task-oriented, and flexible nature of work on these platforms. We focus our analysis on the introduction of two types of gen AI tools: ChatGPT and image-generating AI. Specifically, we wanted to understand whether the introduction and diffusion of these tools decreased demand for jobs on this platform and, if so, which types of jobs and skills are affected most and by how much.

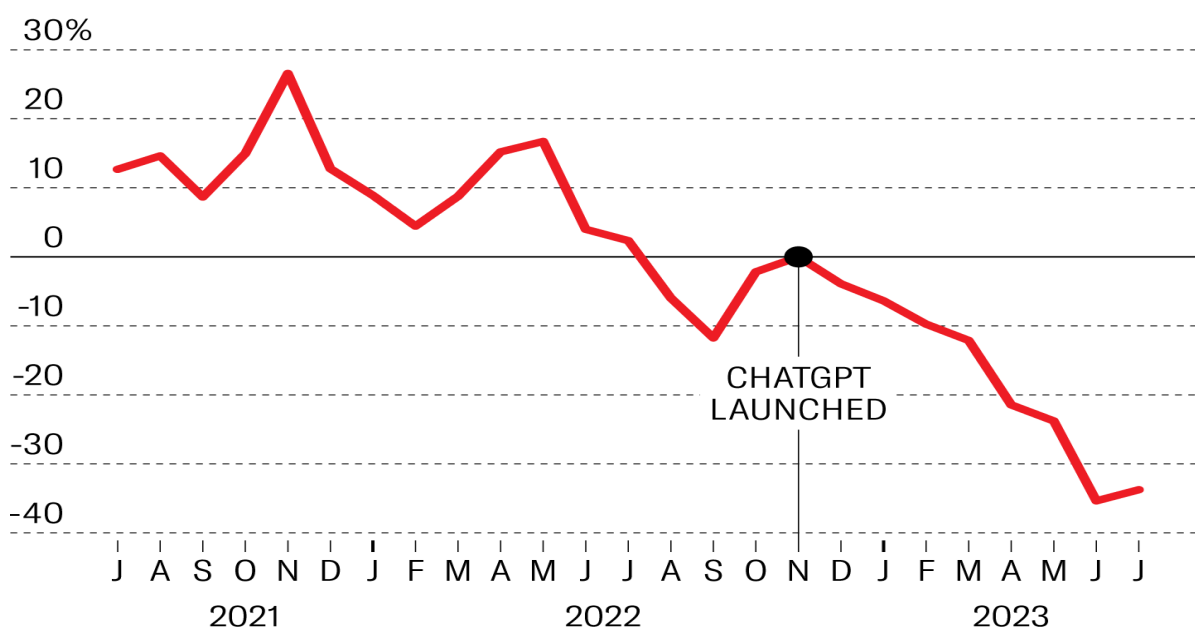
Using a machine learning algorithm, we first grouped job posts into different categories based on their detailed job descriptions. These categories were then classified into three types: manual-intensive jobs (e.g., data and office management, video services, and audio services), automation-prone jobs (e.g., writing; software, app, and web development; engineering), and image-generating jobs (e.g., graphic design and 3D modeling). We then examined the impact that the introduction of Gen AI tools had on demand across these different types of jobs.

We find that the introduction of ChatGPT and image-generating tools led to nearly immediate decreases in posts for online gig workers across job types, but particularly for automation-prone jobs. After the introduction of ChatGPT, there was a 21% decrease in the weekly number of posts in automation-prone jobs compared to manual-intensive jobs. Writing jobs were affected the most (30.37% decrease), followed by software, app, and web development (20.62%) and engineering (10.42%).

The Impact of ChatGPT on Automation-Prone Jobs vs. Manual-Intensive Jobs

Following the introduction of ChatGPT in November 2022, there was steep decrease in demand for automation prone jobs, compared to manual-intensive ones.

Change in number of posts for automation-prone jobs, compared to manual-intensive jobs
Relative to launch of ChatGPT



Source: Ozge Demirci, Jonas Hannane, and Xinrong Zhu

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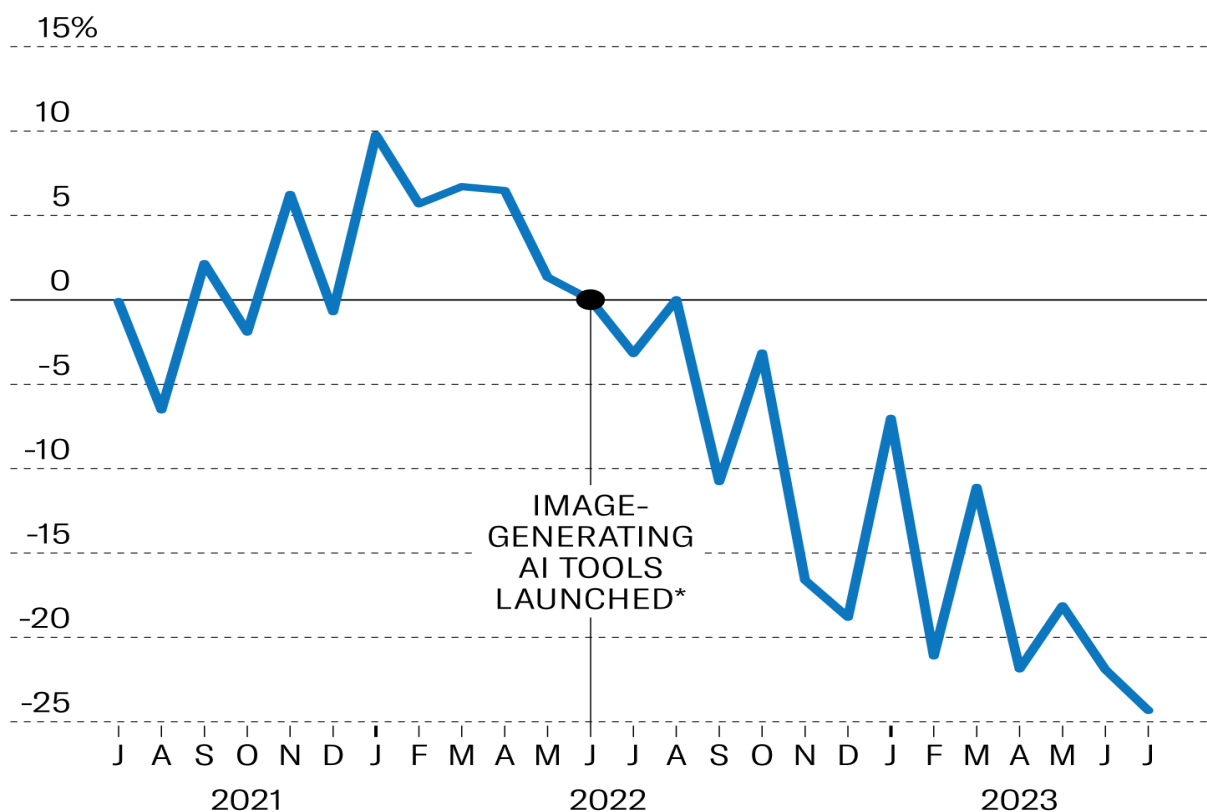
A similar magnitude of decline in demand was observed after the introduction of popular image-generating AI tools (including Midjourney, Stable Diffusion, and DALL-E 2) were introduced. Within a year of introducing image-generating AI tools, demand for graphic design and 3D modeling freelancers decreased by 17.01%.

The Impact of Image-Generating AI Tools on Image-Generating-Related Jobs vs. Manual-Intensive Jobs

Demand for image-generating-related jobs, compared to manual-intensive jobs, declined after the introduction of popular image-generating AI tools in June 2022.

Change in number of posts for image-generating-related jobs, compared to manual-intensive jobs

Relative to launch of image-generating AI tools



*June is used as the beginning of image-generating AI's introduction; Midjourney was launched in July, Stable Diffusion in August, and DALL-E 2 in September 2022.

Source: Ozge Demirci, Jonas Hannane, and Xinrong Zhu

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Additionally, we noticed that over time, there were no signs of demand rebounding, revealing a growing trend of job replacement. We compared this impact against both typical seasonal demand fluctuations on the job platform and the effects that automation had on traditional labor markets. The impact produced by gen AI tools was significantly more substantial. Comparing gen AI's hits to robotic automation for example, [researchers found](#) that a 20-percentage-point increase in robot adoption in French manufacturing led to only a 3.2% decline in industry employment.

Increased Competition with Both Humans and Tools

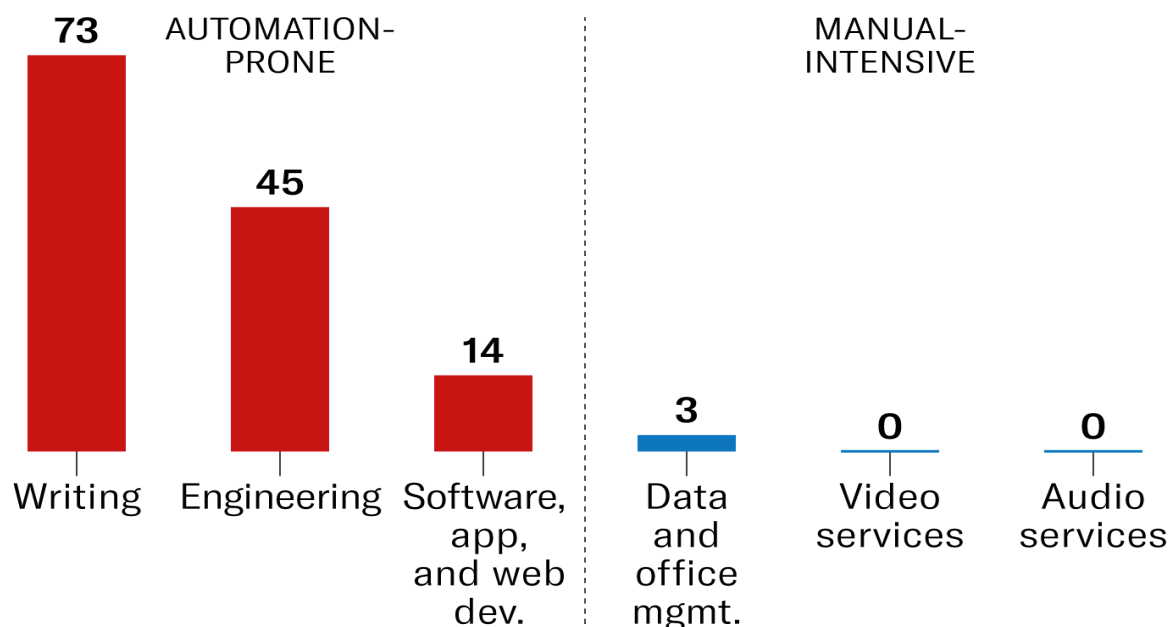
This drop in demand has also led to intensified competition in automation-prone jobs. We find that the average number of bids (submitted by freelancers to secure a job) per job post submitted by freelancers to obtain the task in automation-prone jobs rose by 8.57% after introducing ChatGPT. This result suggests that freelancers with certain skills may face more competition for limited jobs. Due to the already fierce competition for jobs in online labor markets, the growing substitutability, for employers, between freelancer jobs and gen AI can lead to a further decline in job opportunities in the short term.

The decrease in demand aligns with increased awareness of gen AI tools and interest in using them. In our study, we also examined trends related to job demand and Google search volume. After the introduction of ChatGPT, we looked at the average Google search volume index (SVI) for different job categories, and found that automation-prone sectors like writing and engineering exhibited the highest search interest, while manual-intensive tasks, like audio and video services, show little to no search volume increases. Overall, we find a negative correlation between the Google search volume index (SVI) and the number of jobs posted across different types, meaning the higher the search volume, the more likely that industry was impacted by gen AI. This suggests that industries with greater public awareness about gen AI's potential experience a larger decline in freelancer demand.

Average Growth in Google Search Volume for Jobs Following the Introduction of ChatGPT

In the months following ChatGPT's introduction, the volume of Google searches for writing, engineering, and software, app, and web development — automation-prone jobs — increased, while searches for manual-intensive jobs remained relatively stable.

Average Google Trends Search Volume Index, by job type* November 2022–July 2023



*Google's Search Volume Index (SVI) is based on a 100-point scale, where 100 signifies that a keyword was very popular — searched at a high frequency — relative to other keywords searched; 0 signifies that a keyword was relatively unpopular. Keywords used to collect the Google SVI data were combinations of searches of ChatGPT and job-type descriptions, such as "ChatGPT writing."

Source: Ozge Demirci, Jonas Hannane, and Xinrong Zhu



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Changes in the Labor Market Dynamics

In addition to job replacement, we also looked at other demand factors like job complexity and how much employers are willing to pay workers. We measured complexity by the number of skills required for each job post and found that it increased by 2.18% for automation-prone jobs compared to manual-intensive

ones post-ChatGPT. Employers' willingness to pay for these automation-prone jobs also went up by 5.71%. These results suggest that after ChatGPT's launch, automation-prone jobs have become slightly more complex, requiring a wider range of skills, and that employers are willing to pay more for these jobs.

Interestingly, job posts that include "ChatGPT" in their skill requirement also saw an increase. In the period after ChatGPT introduction, we found 903 job posts listing ChatGPT in the skill tags. In addition, more than 88% of these jobs fall into automation-prone categories, with the majority (82%) specifically related to software, app and web development. The number of job posts seeking "ChatGPT" skills has grown steadily, with an average increase of 0.68 posts per week since its introduction.

These results suggest that the ability to integrate AI tools into work is becoming increasingly valued, and workers are likely updating their skill sets to include gen AI capabilities. This shift underscores that reskilling is not only underway but is also becoming an essential response to the evolving job market driven by gen AI advancements.

How Companies Can Navigate This New Landscape

The short-term impact of gen AI on specific roles — especially those susceptible to automation — has been swift and unavoidable. Compared to traditional automation technologies, the speed and extent of gen AI's effect are unprecedented. As shown in our study, automation-prone jobs like writing and coding saw significant declines in demand while new types of work requiring AI-related skills began emerging.

The rapid advancement of gen AI technologies presents both opportunities and challenges for businesses, particularly regarding workforce management. Our research demonstrates that while some job replacements are inevitable, companies have a critical role in shaping how AI is integrated into their operations. Below, we outline key implications for managers and organizations to navigate this shift effectively.

Approach matters

Proactive, transparent communication with employees about AI's potential to reshape the job market is essential. While some job replacement will occur, transparency about the nature of these changes can help mitigate uncertainty and foster a culture of adaptability, preparing workers for this next wave of technological disruption. Companies in industries particularly exposed to automation risks should prioritize immediate action, explaining to their workforce how AI will be used, and for what purposes, while providing reassurance about the value of their contributions.

Embrace gen AI as an opportunity to upskill and reskill

Despite concerns about job losses, AI also offers opportunities for job augmentation and productivity gains. Our findings show that jobs requiring AI-related skills, such as those involving ChatGPT, are rising. As job roles evolve to integrate AI tools, companies need to focus on building a workforce equipped with a diverse set of skills that adapt to and complement these technological shifts.

To stay competitive, employees must engage in continuous learning and upskilling. In their book [*Prediction Machines*](#), authors Ajay Agrawal, Joshua Gans, Avi Goldfarb argue that AI is shifting the focus of work away from predictive tasks to those requiring human judgment and decision-making. Research conducted by highlights that AI integration significantly boosts productivity across various skill levels, with the greatest benefits observed among workers who hold low-wage jobs. This evidence reinforces the strategic value of investing in AI training, as it can help bridge skill gaps and enhance overall productivity. Managers should consider focusing on equipping low-wage workers with AI tools and developing supportive training programs.

[Recent findings](#) also indicate a substantial gender gap in the usage of ChatGPT at work, with women being significantly less likely to adopt ChatGPT in the same occupations. This highlights the need for tailored training programs to address these disparities and ensure equitable access to the advantages of gen AI across all employees.

Furthermore, simply providing access to AI might not be sufficient; companies should also invest in specific job-related and targeted training programs that help employees effectively utilize these tools to enhance their work, as suggested by [Emma Wiles and her coauthors in a recent paper](#). For businesses, this shift necessitates the creation of learning and development initiatives tailored to the

new AI-driven economy. Partnering with industry leaders and educational institutions can help managers design training programs addressing evolving skill needs. Companies like Microsoft and IBM, which have already established robust AI training partnerships, provide valuable examples of how businesses can stay ahead of the AI learning curve. For businesses, this shift necessitates the creation of learning and development initiatives tailored to the new AI-driven economy. Partnering with industry leaders and educational institutions can help managers design training programs addressing evolving skill needs. Companies like Microsoft and IBM, which have already established robust AI training partnerships, provide valuable examples of how businesses can stay ahead of the AI learning curve.

Managers will also need to develop new competencies, particularly in AI task delegation. Understanding which tasks to assign to AI systems versus human employees will be critical in maximizing efficiency while preserving human creativity and oversight. As AI takes on more routine functions, managers must focus on leading teams in ways that leverage the unique strengths of both human and machine capabilities.

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In the long run, companies that embrace upskilling and reskilling initiatives will be better positioned to thrive in a gen AI-driven landscape. By preparing their workforce for the increasing complexity of tasks and fostering adaptability, businesses can remain competitive in the face of technological change.

Gen AI will continue transforming job market dynamics by automating a wide range of tasks. For organizations to succeed, they must invest in developing a workforce capable of integrating AI into daily operations. The strategic focus should be on augmenting human potential rather than merely replacing it. Managers who embrace this mindset will not only help their teams navigate the new technology but also drive long-term growth and innovation in their organizations.

More Resources:

- [Can Startups Thrive in an Age of AI?](#)
- [How CEOs Are Using Gen AI for Strategic Planning](#)
- [Gen AI is Coming from Remote Workers First](#)
- [Is Your AI-First Strategy Causing More Problems Than It's Solving?](#)
- [For Success with AI, Bring Everyone On Board](#)



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