

# Is AI the Next One Up to Bat? The Future of Monozukuri and AI

Yunbin Cho  
University of Tokyo  
Graduate School of Interdisciplinary Information Studies  
Yokoyama Lab

## My First Time Inside a Factory

In September 2025, I joined a project run by Professor Ema's laboratory at the University of Tokyo's Tokyo College, exploring the future of manufacturing in the age of AI. It was an opportunity to bring a student's perspective to an industry undergoing rapid transformation. For me, it was also something more personal: I had never set foot inside a factory before. Growing up, factories existed only in news footage — craftspeople hammering metal, sparks flying from welding torches, robots assembling cars with mechanical precision. It all seemed like a kind of magic.

On the day of our visit, my teammates and I put on hard hats and gloves and were guided through three facilities: a welding plant, an engine factory, and an assembly line. In the welding plant, robots handled precision welding while human workers managed the finer adjustments. In the engine factory, I found myself unable to look away from the sight of employees repeating the same motions for nearly two hours in intense heat, without pause. In the assembly plant, we watched a long chain of coordinated steps culminate in a single complete car rolling off the line. Behind the magic of that finished vehicle, I could feel deeply how much labor and cooperation from each individual worker had been built up.

## Can AI Do *Monozukuri*?

One thing that surprised me was how little AI or AI-driven robotics was visible on the factory floor. In Japan, the integration of AI into manufacturing is still in its early stages and remains a subject of active debate. This prompted a basic but important question: what is the difference between a conventional robot and an AI-powered one? The robots I observed were designed to handle tasks that are physically demanding, hazardous, or exhausting — relieving workers of a significant burden. But they do not think. When something unexpected happens, they simply stop. AI, on the other hand, can read a situation, make judgments, and propose solutions. In that sense, I believe AI is evolving beyond merely assisting people into something that works much as a person does. A future where AI takes over on-site operations and humans shift into managerial roles is not difficult to imagine — one where engineers spend their days reviewing AI decisions on screens rather than using their hands.

This raised a question I found hard to shake: can AI practice *Monozukuri*? *Monozukuri* encompasses far more than the act of manufacturing — it refers to the entire process and spirit of making things. Within it lives a culture of putting care into every detail, the spirit of *kaizen*, in which workers on the floor continuously identify and implement improvements themselves, and the principle of *Gemba*, which calls for leaders to engage

directly with the workplace. If AI were to take over all frontline work and humans remained only in management, could what remain still be called Monozukuri? What would be lost is not just the tedious or dangerous tasks, but the embodied knowledge workers develop over years — the intuitions in their hands, and the collaboration and communication between seasoned colleagues.

## What Must Be Preserved Amid Change

At the same time, this transformation could become the foundation of a new kind of Monozukuri. Japan's manufacturing sector has long cultivated a culture in which workers on the floor think for themselves, voice their opinions, and push for improvement — and that is a spirit of not standing still. The sector also faces long-unresolved challenges: low participation of women in the workforce, the need to adapt to globalization and shifting lifestyles, and a growing imperative to improve employee wellbeing. Simply preserving the status quo is not the answer. The introduction of AI and the reshaping of roles could open fresh perspectives on these issues.

That said, AI is not a cure-all. Because AI systems learn from vast datasets, they can produce biased or incorrect outputs. Energy consumption and environmental burden are also growing concerns. There are also voices pointing out that once AI is introduced into the workplace, re-checking its output ends up taking considerable time. Among engineers, too, the common experience is that while delegating code to AI is convenient, scrutinizing the results is demanding work.

Naturally, I was unable to arrive at a clear answer amid all these competing considerations. But what those two days on the factory floor made undeniably clear was this: behind the magic of a car rolling off the line, there are real people — their effort, their cooperation, their presence. They are what connects Monozukuri past to its future. That is why I came to believe that the most important first step is simply to ask them. Would workers on the floor want an AI to call out the guiding signals that keep operations moving, or would they want to keep that voice as their own? Thinking seriously about the future of AI and work — including the future of Monozukuri — means starting from small questions like this, built together with the people who are actually there.



Image generated by AI based on the storyboard

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## AI Declaration

The manuscript translation (Japanese and English) was conducted using Claude (Anthropic). The image was generated using ChatGPT (OpenAI).