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# The Long-Term Jobs Killer Is Not China. It's Automation.; Robot Revolution

The New York Times

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**Highlight:** "Everything we did, you could program a robot to do it."

## Body

The first ***job*** that Sherry Johnson, 56, lost to automation was at the local newspaper in Marietta, Ga., where she fed paper into the printing machines and laid out pages. Later, she watched machines learn to do her ***jobs*** on a factory floor making breathing machines, and in inventory and filing.

"It actually kind of ticked me off because it's like, How are we supposed to make a living?" she said. She took a computer class at Goodwill, but it was too little too late. "The 20- and 30-year-olds are more up to date on that stuff than we are because we didn't have that when we were growing up," said Ms. Johnson, who is now on disability and lives in a housing project in Jefferson City, Tenn.

Donald J. Trump told workers like Ms. Johnson that he would bring back their ***jobs*** by clamping down on trade, offshoring and immigration. But economists say the bigger threat to their ***jobs*** has been something else: automation.

"Over the ***long*** haul, clearly automation's been much more important - it's not even close," said Lawrence Katz, an economics professor at Harvard who studies labor and technological change.

No candidate talked much about automation on the campaign trail. Technology is not as convenient a villain as China or Mexico, there is no clear way to stop it, and many of the technology companies are in the United States and benefit the country in many ways.

Mr. Trump told a group of tech company leaders last Wednesday: "We want you to keep going with the incredible innovation. Anything we can do to help this go along, we're going to be there for you."

Andrew F. Puzder, Mr. Trump's pick for labor secretary and chief executive of CKE Restaurants, extolled the virtues of robot employees over the human kind in an interview with Business Insider in March. "They're always polite, they always upsell, they never take a vacation, they never show up late, there's never a slip-and-fall, or an age, sex or race discrimination case," he said.

Globalization is clearly responsible for some of the ***job*** losses, particularly trade with China during the 2000s, which led to the rapid loss of 2 million to 2.4 million net ***jobs***, according to research by economists including Daron Acemoglu and David Autor of M.I.T.

People who work in parts of the country most affected by imports generally have greater unemployment and reduced income for the rest of their lives, Mr. Autor found in a paper published in January. Still, over time, automation has had a far bigger effect than globalization, and would have eventually eliminated those ***jobs*** anyway, he said in an interview. "Some of it is globalization, but a lot of it is we require many fewer workers to do the same amount of work," he said. "Workers are basically supervisors of machines."

When Greg Hayes, the chief executive of United Technologies, agreed to invest $16 million in one of its Carrier factories as part of a Trump deal to keep some ***jobs*** in Indiana instead of moving them to Mexico, he said the money would go toward automation.

"What that ultimately means is there will be fewer ***jobs***," he *said on CNBC*.

Take the steel industry. It lost 400,000 people, 75 percent of its work force, between 1962 and 2005. But its shipments did not decline, according to *a study* published in the American Economic Review last year. The reason was a new technology called the minimill. Its effect remained strong even after controlling for management practices; ***job*** losses in the Midwest; international trade; and unionization rates, found the authors of the study, Allan Collard-Wexler of Duke and Jan De Loecker of Princeton.

Another *analysis*, from Ball State University, attributed roughly 13 percent of manufacturing ***job*** losses to trade and the rest to enhanced productivity because of automation. Apparel making was hit hardest by trade, it said, and computer and electronics manufacturing was hit hardest by technological advances.

Over time, automation has generally had a happy ending: As it has displaced ***jobs***, it has *created new ones*. But some experts are beginning to worry that this time *could be different*. Even as the economy has improved, ***jobs*** and wages for a large segment of workers - particularly men without college degrees doing manual labor - have not recovered.

Even in the best case, automation leaves the first generation of workers it displaces in a lurch because they usually don't have the skills to do new and more complex tasks, Mr. Acemoglu found in *a paper* published in May.

Robert Stilwell, 35, of Evansville, Ind., is one of them. He did not graduate from high school and worked in factories building parts for tools and cars, wrapping them up and loading them onto trucks. After he was laid off, he got a ***job*** as a convenience store cashier, which pays a lot less.

"I used to have a really good ***job***, and I liked the people I worked with - until it got overtaken by a machine, and then I was let go," he said.

Dennis Kriebel's last ***job*** was as a supervisor at an aluminum extrusion factory, where he had spent a decade punching out parts for cars and tractors. Then, about five years ago, he lost it to a robot.

"Everything we did, you could program a robot to do it," said Mr. Kriebel, who is 55 and lives in Youngstown, Ohio, the town about which Bruce Springsteen sang, "Seven hundred tons of metal a day/Now sir you tell me the world's changed."

Since then, Mr. Kriebel has barely been scraping by doing odd ***jobs***. Many of the new ***jobs*** at factories require technical skills, but he doesn't own a computer and doesn't want to.

Labor economists say there are ways to ease the transition for workers whose ***jobs*** have been displaced by robots. They include retraining programs, stronger unions, more public-sector ***jobs***, a higher minimum wage, a bigger earned-income tax credit and, for the next generation of workers, more college degrees. The White House on Tuesday released a report on automation and the economy that called for better education from early childhood through adult ***job*** transitions and for updating the social safety net with tools like wage insurance. Few are policies that Mr. Trump has said he will pursue.

"Just allowing the private market to automate without any support is a recipe for blaming immigrants and trade and other things, even when it's the ***long*** impact of technology," said Mr. Katz, who was the Labor Department's chief economist under President Clinton.

The changes are not just affecting manual labor: Computers are rapidly learning to do some white-collar and service-sector work, too. Existing technology could automate 45 percent of activities people are paid to do,

according to a July *report by McKinsey*. Work that requires creativity, management of people or caregiving is least at risk.

Ms. Johnson in Tennessee said both her favorite and highest-paying ***job***, at $8.65 an hour, was at an animal shelter, caring for puppies.

It was also the least likely to be done by a machine, she said: "I would hope a computer couldn't do that, unless they like changing dirty papers and giving them love and attention."

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PHOTO: A steel minimill in California. Minimills have made it possible to produce steel with fewer workers, one cause of big ***job*** losses in the sector. (PHOTOGRAPH BY DAVID MCNEW/GETTY IMAGES)

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