

**Martin Ford**

## **Could Advancing Robotics and Automation Bring on an Unemployment Crisis?**

Nearly all forecasts agree anticipate high unemployment and underemployment to continue in Korea for years to come—and that in spite of the fact that Korea is better off than many countries. But could it be possible that even these dire projections underestimate the profound impact of another trend not even considered in evaluations of the current economic downturn, one that may make future job creation significantly more challenging?

There can be little doubt that computers, robotic technologies and other forms of job automation are growing more sophisticated and the range of their applications is expanding rapidly. If this trend continues, more workers are certain to be displaced in the near future, including some workers who never thought their jobs could be automated. Korea is poised to become a leader in the robotics industry and major corporations like Samsung are investing heavily in the field. The government is even planning a “Robot Land” theme park in Incheon. But what are the long-term implications of these robots?

Most economists dismiss any concern that the rise of robots might lead to permanently high unemployment. When the economist Milton Friedman noticed that a major public works project was being carried out by large numbers of workers with shovels instead of heavy machinery. He remarked derisively this if this was a “jobs program” then “why not give the workers spoons, instead of shovels?”

Most economists, however, have yet to fully appreciate the extent to which the evolution of information technology today is unprecedented in the mechanical innovations of the past. Because a large percentage of jobs are, on some level, essentially routine and repetitive in nature, more

jobs than one might imagine can be broken down into a discrete set of tasks that are repeated on a regular basis.

Even in low-wage China, Foxconn has announced the introduction of millions of new robots in its electronics assembly factories. The implication is that robots can simply carry out tasks with a consistency and over a length of time that humans simply cannot match.

And the impact goes far beyond manufacturing. In Korea, robotic prison guards will soon patrol a jail in Pohang and in schools, “telepresence” robots have combined with offshoring of teachers, to allow English teachers in the Philippines to interact directly with students in Seoul.

As hardware and software advances, a large fraction of jobs are ultimately going to be open to robotic or software automation. The next generation of machine learning technology has the potential to duplicate rather complex routines and do them better than humans who are easily distracted. Major corporations are capturing enormous amounts data about their businesses—including the activities of their workers. Those activities can be represented by complex algorithms and those will be the basis for effective automation.

We are not talking about dreamy science fiction, but rather a simple extrapolation based on anticipated advancements in the expert systems and specialized algorithms that can currently land jet airplanes, trade autonomously on Wall Street, or beat nearly any human being at a game of chess. IBM's Watson – the computer that prevailed at Jeopardy! – suggests that a machine basing its learning on algorithms may soon be capable of taking a number of more complex cognitive tasks. As technology accelerates exponentially, there is little doubt that these systems will begin to match or exceed the capability of human workers in many routine job categories.

Such routine work includes much of what is currently done by workers with college degrees or other significant training. Even highly skilled

professionals like lawyers are already losing jobs to specialized algorithms that can analyze legal documents. Some experts also predict that medical doctors will soon face competition from powerful automated diagnostic systems and perhaps even robotic surgical technology. Many specialists, let alone manual laborers, will see their jobs increasingly threatened. Moreover, automation encourages the trend towards pushing tasks, from bagging groceries to pumping gas, onto the consumer.

One of the most extreme historical examples of technologically induced job losses is, of course, the mechanization of agriculture. In the late 1800s, about three quarters of workers in the U.S. were employed in agriculture. Today, the number is around 2-3%. Advancing technology irreversibly eliminated millions of jobs, causing catastrophic unemployment in the short and medium terms.

Still, when agriculture mechanized, we did not end up with long-term or permanent structural unemployment. Workers were eventually absorbed by other industries, and average wages and overall prosperity increased dramatically as consumers were able to spend more of their incomes on things other than food.

The question we have to ask is whether or not that same scenario is likely to play out again as technology increasingly affects not just manufacturing but also white collar and service sector jobs. But this time we are looking at a single industry being automated. When agriculture was mechanized, there were clearly other labor intensive sectors capable of absorbing the workers. Computers and robots are moving up to a par with humans in terms of coordination and response to complex information and unpredictable scenarios this time around.

There may not be any new field into which the unemployed can possibly move. As automation transforms all sectors of work, there will come a "tipping point," beyond which the overall economy can no longer continue to absorb workers who lose their jobs due to automation (or migration of jobs to lower wage countries). Businesses will be able

to ramp up production primarily by employing machines and software – and the unemployment problem will decouple from economic factors and radically decline as part of a fundamental restructuring of the mode of production.

But what about the consumer demand on which we base our modern economy? If automation is relentless, then the basic mechanism that creates purchasing power for consumers will begin to break down. We can see some indications of this crisis in the manner in which debt, rather than income, has become the driving force for spending. That shift in the economy was a central factor in the financial crisis of 2008, and increasing automation—and related reliance on debt for economic growth—could mean that future crises are awaiting us.

Imagine a fully automated economy. Virtually no one would have a job, and machines would do everything. So if no one has incomes, who will buy the products and services being produced?

If we're still considering a market (rather than a planned) economy, why would production continue if there weren't any viable consumers to purchase the output? Long before we reach full automation, mass-market business models would become unsustainable.

The situation will likely be even worse in countries like Korea that also face the demographic crisis of a superannuated population. As an unprecedented proportion of the population reach an advanced age their spending drops and what consumption does take place is skewed heavily toward healthcare. That will make it even more difficult to sustain the consumer spending that powers economic growth.

Stagnating or declining wages for Korean workers, when combined with growing inequality in wealth and increasing productivity supported by consumption based on debt rather than income are hints that current economic challenges cannot be fixed through the monetary policies found in the economist's toy box. Unemployment needs to be treated as

a structural problem demanding a complete remaking of our society and economy. Even if Korea invests heavily in training and education so that workers can take on more complex (and less routine) tasks the results will be only temporary.

We must first come to terms with the immensity of the challenge from automation and start a frank discussion about possible solutions. Exponential development of IT technology means an increasingly jobless economy wherein machines and computers will do more and more of the work. If wait until the evidence becomes incontrovertible, it will be very late in the game.

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