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A SELF-DRIVING car by Google is displayed at the Viva Technology event in Paris, France, in June..  
(Photo by: REUTERS)

## Is Israel prepared for a brave new world in which robots do the work humans once did?

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Modern economies like that of Israel have a Gross Domestic Product that is three-quarters or more services – things people do for other people, and only one-quarter or less, tangible goods.

ON WEEKDAYS, most people get up in the morning and go to their jobs. The fortunate ones work because they love to; the less fortunate work to support themselves and their families; and the vast majority of workers are a combination of both.

What would life without a job be like? What if robots and computers did nearly all the work once done by humans? This is not science fiction. Increasingly, these tasks are being done by smart machines.

Progressive countries like Finland and Sweden are already shaping public policy for an age when there are few jobs, only the gifted and the privileged work, and everyone is given a universal basic income instead.

According to research done at Britain's Oxford University, within two decades, machines will be

able to do half of all jobs in the United States. Since Israel's economy is similar, that startling number applies to us, as well.

For Israel, facing a host of burning problems – lone-wolf terrorism, Hezbollah and Hamas, Iran, a ballooning budget deficit, renewed inflation, soaring housing prices, stagnant exports, polarized politics – the issue of technological unemployment seems distant and low priority. And, after all, unemployment hit an all-time historical low of 4.7 percent in July, compared with an average of 7.4 percent from 1992 until 2016. Moreover, revised GDP growth figures show that in the first half of this year, the economy grew 3 percent faster than first reported, boosted by strong 5 percent growth in consumer spending.

Besides, technophobia – fear of job loss through automation – has never proven justified.

New technologies have historically created more jobs than they destroyed. The Luddites in Britain – textile workers fearing mechanical looms would put them out of work – smashed machines, but overall, the textile industry grew.

So, why worry? Perhaps, because, this time, robots really will win. What if, in the current Fourth Industrial Revolution, jobs really do disappear? Decades ago, the British economist J.M. Keynes agonized that by 2030 we would only work three hours a day because “machines would do our jobs for us.”

“Are we going to be unemployed?” Keynes asked, noting that work gives meaning to our lives. And happiness, as well.

Research by the Hungarian psychologist Mihaly Csikszentmihalyi showed that it is not just the money earned from work that makes people happy but the work itself (though, admittedly, he had in mind creative work, not the humdrum kind). He used pagers to remind people to record their feelings at frequent points during the workday and found more happiness than in leisure time.

This is a strong paradox, because many people use work to gain income to buy leisure.

One of the most common occupations among Israeli men is driving – delivery vans, trucks, taxis, limos. There are over 3 million motor vehicles in Israel – including 2.6 million private cars and 322,000 trucks.

Self-driving cars and trucks are now a reality.

Ford Motor Co.'s CEO promises a mass-produced self-driving car with no pedals or steering wheel in five years. Many such vehicles are already on the road. I have a friend in California whose car parks itself. What, then, will happen to the jobs of those who drive for a living? The biggest employer in the world is Wal-Mart; 2.2 million people worldwide work there. What happens when shoppers find what they need by asking a robot, then check themselves out using barcodes? Both are in use today. Many of those Wal-Mart jobs, already low-wage, will disappear, and with them millions of other retail jobs.

The second biggest employer in the world is Foxconn, officially known as Hon Hai Precision Industry Co. Ltd., employing 1.3 million workers, mainly in China. What happens to those jobs

when Foxconn shifts to “lights out manufacturing” – fully automated 24/7 plants with no human presence – and therefore need no lighting. This is already occurring.

The Japanese robotics firm Fanuc has been running such a factory for 15 years.

Facing a labor shortage owing to the onechild policy, now being phased out, China has initiated a “robot replace human” program.

A huge factory in Dongguan, a city in the Pearl River Delta, now operates solely with robots.

Israel’s biggest global company Teva Pharmaceutical Industries operates a huge “pick-and- place” warehouse visible from Highway 6, near the turn-off to Ben-Gurion Airport.

Warehouses today employ many workers, in Israel and abroad. But with pick-and-place robots, a handful of workers put things on shelves, but robots find them, pick them, place them in cartons and deliver them to their destination. Most warehouse jobs will disappear as a result.

Iscar, the Israeli cutting-tools company now owned by Warren Buffett’s Berkshire Hathaway, has had this technology for years.

Years ago, I saw Iscar’s Automatic Guided Vehicles (AGV) taking parts from place to place in its plant, instead of humans.

Nor is it solely relatively menial jobs, such as driving, selling and warehousing that are being mechanized. IBM recently developed a supercomputer named Watson, which defeated top contestants in the TV game “Jeopardy.”

Watson’s artificial intelligence is now a medical genius.

Watson can already store far more medical information than can individual doctors, and its decisions are all evidence-based, free of biases and overconfidence. Watson has no ego. It can understand ordinary language and evaluate hypotheses or guesses. Will Watson replace many human doctors? Will Watson know what is wrong with us when doctors may not? Worldwide, e-commerce (purchase of goods online) is booming. In China, e-commerce is growing by up to 50 percent a year.

E-commerce is putting retail shops and businesses out of business. And its job creation is minimal.

In 2012, Amazon founder Jeff Bezos paid 775 million dollars to purchase a start-up named Kiva, which developed stubby orange robots that expedite filling warehouse orders for Amazon’s e-commerce business.

Amazon now has 30,000 Kiva robots, which replaced untold human workers. Such robots soon will be widely employed. And, after Kiva robots fill orders, Amazon drones are experimentally beginning to deliver packages, in place of FedEx drivers.

How well prepared are we, in Israel, to deal with this social tidal wave, already upon us? We are

ill-prepared and have barely begun to think about it.

Recently, the Shanghai Rankings of world universities reported that Technion-Israel Institute of Technology, where I am employed, rose to 69th in the world in 2016, up 10 spots from 2015. At the same time, a high-level committee appointed by the National Union of Israeli Students is casting doubt on the relevance of what, and how, higher education teaches.

“When [graduates] come to the workplace,” noted committee member Moshe Vigdor, formerly CEO of the Council for Higher Education, “they are told, ‘It’s great you have a degree, now sit and start to learn what we really do.’” Several organizations offer online courses, mostly free, to students all over the world.

I’ve had the privilege of creating three such courses, on entrepreneurship, for Coursera, which was founded by an Israeli, Daphne Koller.

More than 15 million students have taken Coursera courses. Why? Many of them already have college degrees, but they seek skills they need and did not get in school.

The World Economic Forum (WEF), based in Davos, Switzerland, just published a report “Future of Jobs” that lists the top 10 skills in the workplace in the year 2020.

They include complex problem solving, critical thinking, creativity, emotional intelligence and cognitive flexibility. Note that most of them are non-robotic. In my 40 years of teaching, I don’t recall teaching any of those skills (with the possible exception of creativity).

“Traditional education is often badly equipped to develop dynamic skills in students,” notes the WEF report. “Most schools and universities are teaching a 20th century education to young people who will need cutting-edge 21st century skills.”

How should we educate our young people to prepare them for a world in which many of the skills we are currently teaching will be done better by machines? Universities are painfully slow in grappling with this issue.

If jobs really do disappear in future, what should Israel and the world do about it? On June 5, Swiss citizens voted in a referendum that called for providing a universal basic income (UBI) of 2,500 Swiss francs (10,000 shekels) for all Swiss adults, and 625 Swiss francs (2,500 shekels) for children.

The proposal was overwhelmingly defeated with 77 percent voting “No.” I suspect, however, that in time, in a world without jobs, UBI will prevail.

New York Times columnist Eduardo Porter wrote, “The idea of the American government agreeing to tax capitalists enough to hand out checks to support the entire working class is an entirely new category of fantasy.”

But, he might have noted, social security and unemployment insurance were also fantasies at the start of the Great Depression until they were enacted into law.

What is fantasy in the US is reality in Finland. Finland's Prime Minister Juha Sipilä, once an information technology entrepreneur, has asked the country's social insurance body, Kela, to do an experiment.

It will establish whether a basic income could "make the system more participatory and strengthen work incentives, reduce bureaucracy and simplify the now complicated benefit system in a way that ensures the sustainability of public finances."

The experiment will take place in 2017 and will involve 5,000 to 10,000 Finns being paid a basic income of 500 to 700 euros (about 2,135 to 3,000 shekels) a month.

The idea that social policy should first be tested, in small-scale experiments, was pioneered by MIT professor Esther Duflo and her colleagues who experimented with ways to alleviate poverty.

It is worth a try in Israel, which excels in hi-tech innovation but leaves creativity at the doorstep when it comes to public policy.

Perhaps there is a bright side to life without work. The Dalai Lama once wisely observed: "We should love people and use things; the chaos in the world is caused by the fact that, instead, we love things and use people."

There is much truth to this. Modern economies like that of Israel have a Gross Domestic Product that is three-quarters or more services – things people do for other people, and only one-quarter or less, tangible goods.

As service providers, people, thus, become things that are used by others.

If robots take over as our service providers, will we return to an era when people are loved and machines are used? Perhaps, in life without work, society will at last become more humane, more thoughtful, more caring.

Perhaps we will at last devote most of our time to beauty, art, philosophy, literature and helping others.

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