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Japan's Quest for Robotics Revolution: How Far Will It Go?

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Synopsis

Japan plans to further increase the use of robots to overcome a host of societal and economic challenges associated with falling birth rates, ageing population, and declining economic productivity. Will these plans remain an aspiration or can Japan overcome the institutional and societal impediments to achieve a robotic revolution.

Commentary

PRIME MINISTER Shinzo Abe announced in 2014 a five-year plan to expand the use of robots in manufacturing, supply chains, construction and health care, to overcome challenges associated with falling birth rates, ageing population, and declining productivity in manufacturing and service sectors. Most advanced economies, along with some emerging countries like China, have in recent years initiated plans to develop and deploy robots for enhancing living standards and increasing economic productivity. However, no other country is as ambitious in this regard as Japan in aspiring to integrate robots so thoroughly in almost every aspect of society and economy.

At this moment, it is difficult to ascertain whether these plans remain an aspiration or Japan indeed would achieve a robotic revolution by 2020. Nevertheless, it is obivious that as the third largest economy in the world and as a technological powerhouse, failure or success of these plans in Japan is certain to have far-reaching implications for the region. It is pertinent that we understand what drives Japan towards increased robotisation of its society, and what are the institutional and societal impediments that Japan potentially has to deal with in its quest for a robotics revolution.

Robotics Revolution: Drivers

For most countries, falling birth rates, ageing population, and declining productivity are the usual drivers towards increased automation and robotisation. Japan is no different, but these drivers are more acute and in need of immediate redress.

According to the Tokyo-based National Institute of Population and Social Security Research, Japan's population is estimated to shrink by 30 million in the next 35 years, from the current 126 million people to 95 million by 2050. In addition to the declining birth rates, Japan has to simultaneously deal with an ageing population. It is estimated that the population aged 65 and above is expected to rise from 20 percent of the population in 2005 to 40 percent in the next 10 years.

An associated impact is burgeoning social security costs, which scaled a record high of approximately US$1.3 trillion in 2012. Moreover, demand for health care workers is expected to rise from 1.7 million in 2012 to about 2.5 million by 2025. The government expects service robots to gradually take on more responsibility in care of the elderly along with keeping the costs under control.

In the economic realm, Japan has been witnessing a steady decline in its workforce along with an increase in labour costs and stagnation in service sector productivity. To maintain the 1995 workforce level of 87 million, Japan should have been taking in an estimated 600,000 immigrants a year for the next 50 years, which did not happen; nor is it going to change in the near future. Japan's workforce is now below 80 million.

Over the years, Japan's service sector has been bedeviled by inefficiency — only about 60 per cent as productive as its US counterpart—and its manufacturing sector is bogged by increasing costs. According to the Boston Consulting Group, automation and deployment of robots has the potential to propel the faltering economy by buttressing the declining workforce, reducing the factory labour costs by 25 percent, and improving productivity in the service sector.

Robotics Revolution in 2020: Institutional and Societal Impediments

According to Japan's Robot Revolution Initiative Council, robot technologies "possess the potential for solving social challenges, such as resolving labour shortages, releasing people from overwork, and improving productivity in a variety of sectors, ranging from production in the manufacturing industry, to medical services and nursing care, and to agriculture, construction and infrastructure maintenance". Simply put, Japan aims to integrate robots in everyday life.

In spite of the strong industrial base, proven prowess in robotic technologies, and ample financial resources, Abe's dream of a "robotic revolution" by 2020 has to overcome certain institutional and societal impediments:

First, historically Japanese manufactures failed many times to turn prototypes into commercially viable products—this is especially evident in robotics. Japan is a leader in research, but a follower in application of advanced technologies. For example,

Honda's Asimo is capable of performing sophisticated tasks such as running and walking; AIST, a public research organisation, developed a female fashion robot HRP-4C, which is impressive in its close appearance and ability to mimic certain human moments.

However, in both cases they failed to convert these prototypes into commercially viable and everyday lifestyle products, such as Roomba—the cleaning robot—by iRobot. Even in cases involving practical products such as Cyberdyne's exoskeleton created to assist the elderly, Japanese companies are struggling to create viable business models to commercialise these products.

Second, although Japanese universities and research centres are at the forefront of technological innovations, societal apathy against failure and risk aversion of domestic venture capitalists stymie the development of start-ups, a crucial requirement for commercialisation of prototypes. For example, in spite of developing a bipedal robot, Schaft, a startup funded by two professors from University of Tokyo, failed to garner funding from domestic venture capitalists; Google subsequently acquired Schaft in 2012.

Third, Japanese companies have a leading edge in creating advanced hardware systems, but gradually there is a shift in emphasis from hardware to software in development of robots. Additionally Japanese companies usually prefer closed proprietary systems, which results in shutting out external/third party developers who might have new ideas and innovative solutions.

Fourth is the declining interest among the populace in opting for engineering and technology-related fields for academic and professional pursuits. Although this trend—partly propelled by increasing affluence—started more than two decades ago, its adverse implications for industry and research centres are being felt more severely in recent years.

Fifth, Japan has traditionally been the global leader in industrial robots, especially in the automotive sector. However, more countries in recent years have initiated dedicated plans for developing their domestic robotics industry, resulting in increased competition for Japanese robotic companies. For example in 2013, China employed more industrial robots than Japan. Recently the province of Guangdong—the main hub for Chinese manufacturing—announced investment of US$154 billion for installing robots.

Similarly, South Korea plans to triple sales of robots by 2018 from $1.8 billion (2012). Seoul also announced approximately $1 billion to promote the robotics industry. Further afield, the EU and the US have also initiated programmes such as the EU SPARC Project and the National Robotics Initiative respectively to boost R&D in robotics.

Therefore, Japan's ambitions for a robotic revolution in the pursuit of better living standards and increased economic productivity is possible only by overcoming the existing institutional and societal impediments. This robotic revolution also requires a concomitant evolution in thinking and processes within the society and the government.

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