Committee: Economic and Social Council (ECOSOC)

Issue: Automation and robot economy- rising to the challenge

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INTRODUCTION

As fast-paced technical developments in automation, engineering, energy storage, artificial intelligence, and machine learning intersect, the robotics revolution is rapidly accelerating. It allows for the high bandwidth and low latency that 5G requires, for example, for the practical usage of drones and self-driving automobiles. It is required to run farm machinery and develop robots that deliver medications to pharmacies. It is also essential for network and service security in order to safeguard users and data from cyber-attacks. Briefly said, in this age of the fourth industrial revolution, it is required to operate cutting-edge technologies. Nevertheless, the far-reaching implications will definitely change robot skills and their ability to take over tasks previously performed by humans.

As the second agenda item of the ECOSOC committee, automation and robot economy plays a crucial role in the world economy. Robots are increasingly being used in every industry therefore the increase of the usage of robots affects some labor segments in a negative way. While replacing jobs, automation and robot economy leads to productivity growth and Gross Domestic Product (GDP) growth. For example, international enterprises such as Amazon and Tesla reinforced their production areas and/or warehouses with a variety of robots. Also, they have automated the process.

In order to fully comprehend the agenda item at hand, you should primarily determine the aspects of robot economy and automation in different countries including your delegation. Also, you should research the future of automation, where it's leading to.

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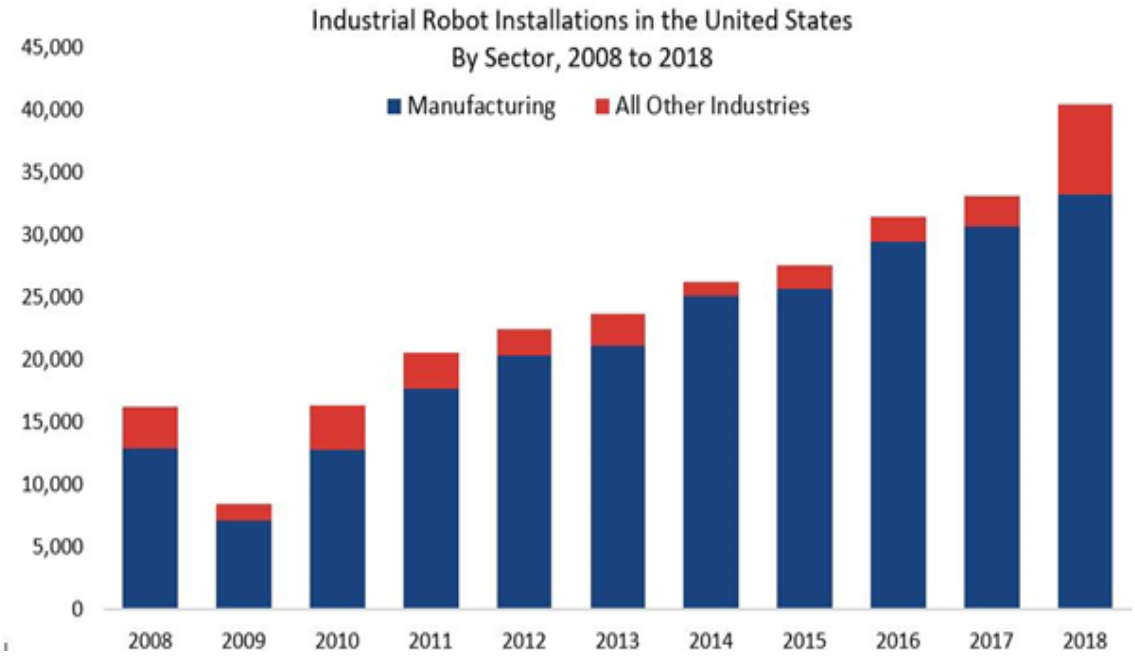
DEFINITION OF KEY TERMS

Automation

Automation is a way of making an apparatus, a system, or a process, function automatically. Another definition of automation, given by the ISA (International Society of Automation) is that it is a way to create and apply technology to monitor and control the production and delivery of products and services.[1]



Robots

Robots are automatically operated machines that replace human effort, although they do not resemble human beings in appearance or perform functions in a human-like manner.

Robot economy

Robot economy is a theory in which most of the labor required to sustain human life is automated. The term robot is associated with both physical systems and AI-enhanced software systems.[2]

[1] *What is automation? - isa*. isa.org. (n.d) https://www.isa.org/about-isa/what-is-automation.
[2] Wigmore, I. (2017, May 17). *What is robot economy? - definition from whatis.com*. SearchEnterpriseAI. https://searchenterpriseai.techtarget.com/definition/robot-economy.

Economy

An economy is a relation between production and consumption acts, that aim to determine how sufficient resources are allotted. In an economy, the producing and consuming of resources happens to fulfil the needs of those living and operating within it.[3]

Artificial Intelligence

Artificial intelligence (AI) is the simulation of human intelligence processes by machines, especially computer systems. Specific applications of AI include expert systems, natural language processing, speech recognition and machine vision.[4] This technology is revolutionary and is currently advancing.

Microprocessor

A microprocessor is any of a type of miniature electronic device that contains the arithmetic, logic, and control circuitry necessary to perform the functions of a digital computer's central processing unit. In effect, this kind of integrated circuit can interpret and execute program instructions as well as handle arithmetic operations.[5]

Software

Software is a set of instructions, data or programs used to operate a computer and perform specific tasks. The two main categories of software are application software and system software.[6] Application software is a type of computer program that performs a specific personal, educational and business function.[7] System software is a type of computer program that is designed to run a computer's hardware and application programs. [8]

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[3] Kenton, W. (2021, September 27). *Exploring how an economy works and the various types of economies*. Investopedia. https://www.investopedia.com/terms/e/economy.asp.
[4] Burns, E., Laskowski, N., & Tucci, L. (2021, July 1). *What is artificial intelligence (ai)? - ai definition and how it works*. SearchEnterpriseAI. https://searchenterpriseai.techtarget.com/definition/AI-Artificial-Intelligence.
[5] Encyclopædia Britannica, inc. (n.d.). *Microprocessor*. Encyclopædia Britannica. https://www.britannica.com/technology/microprocessor.
[6] *What is software?* Webopedia. https://www.webopedia.com/definitions/software/.
[7] Quickbase. (n.d.). *Application software 101 (with examples)*. Quickbase. https://www.quickbase.com/articles/application-software-basics.
[8] Lutkevich, B., & Wigmore, I. (2021, February 1). *What is system Software? – definition from whatis.com*. WhatIs.com. https://whatis.techtarget.com/definition/system-software.

Fixed automation

Fixed automation, also known as "hard automation," refers to an automated production facility in which the sequence of processing operations is fixed by the equipment configuration.[9]

Programmable automation

Programmable automation is a form of automation for producing products in batches.[10]

Flexible automation

Flexible automation is an extension of programmable automation. In flexible automation, the variety of products is sufficiently limited so that the changeover of the equipment can be done very quickly and automatically.[11]

BACKGROUND INFORMATION

The rise of automation in the world's economy is as some would say the defining factor of the future economy, also known as the "robot" economy. The modern introduction in automation development came in 1946 with the Development of the electronic digital computer the ENIAC [Electronic Numerical Integrator and Computer] succeeded by UNIVAC I [Universal Automatic Computer] in 1951, this permitted the control function in automation to become much more sophisticated and the associated calculations to be executed much faster than previously possible. The development of integrated circuits in the 1960s propelled a trend toward miniaturization in computer technology that has led to machines that are much smaller and less expensive than their predecessors yet are capable of performing calculations at much greater speeds. This trend is represented today by the microprocessor.

[9] Encyclopædia Britannica, inc. (n.d.). *Manufacturing applications of automation and robotics*. Encyclopædia Britannica. https://www.britannica.com/technology/automation/Manufacturing-applications-of-automation-and-robotics.
[10] Encyclopædia Britannica, inc. (n.d.). *Programmable automation*. Encyclopædia Britannica. https://www.britannica.com/technology/programmable-automation.
[11] Encyclopædia Britannica, inc. (n.d.). *Flexible automation*. Encyclopædia Britannica. https://www.britannica.com/technology/flexible-automation.

Development of Robotics

Robotics is based on two related technologies: numerical control and teleoperators. Numerical control (NC) is a method of controlling machine tool axes by means of numbers that have been coded on punched paper tape or other media. It was developed during the late 1940s and early 1950s. The first numerical control machine tool was demonstrated in 1952 in the United States at the Massachusetts Institute of Technology (MIT). Subsequent research at MIT led to the development of the APT (Automatically Programmed Tools) language for programming machine tools. A teleoperator is a mechanical manipulator that is controlled by a human from a remote location. Initial work on the design of teleoperators can be traced to the handling of radioactive materials in the early 1940s. In a typical implementation, a human moves a mechanical arm and hand at one location, and these motions are duplicated by the manipulator at another location.

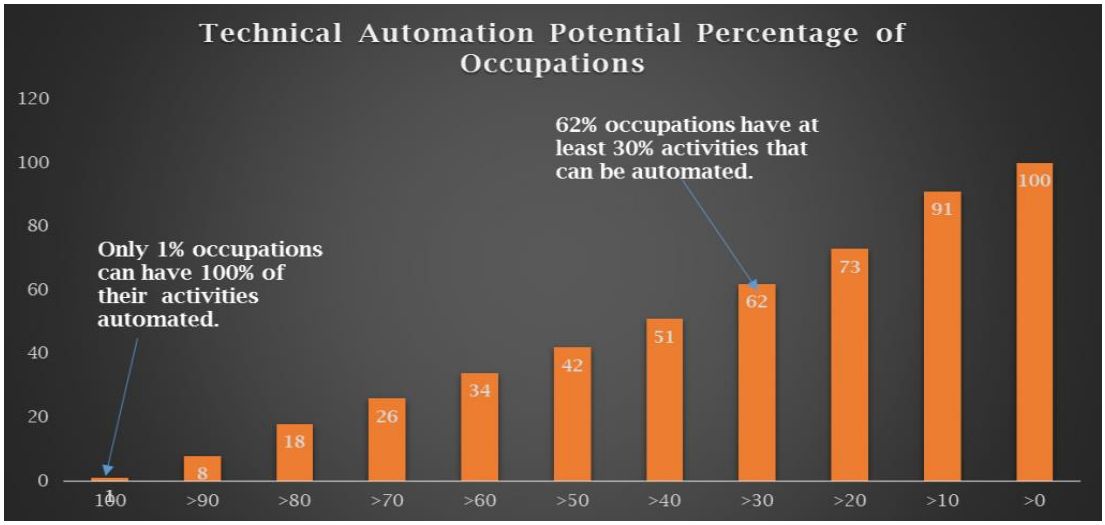
Implementation of Robotics in The Industry

The idea of the industrial robot was born from American engineer George Charles Devol, Jr. in 1954. Later on, Unimation manufactured UNIMATE in 1962, which was the first robot to be implemented by a major manufacturer. General Motors began using it in their New Jersey plant that same year. In 1969, Victor Scheinman invented the Stanford arm at Stanford University. This was an all-electric 6-axis articulated robot. This new technology opened up the possibility for manufacturers to use robots in assembly and welding tasks. Meanwhile, ASEA over in Europe developed the ASEA IRB in 1975 that was the first fully electrically driven robot. It was also the first microprocessor-controller robot that used Intel's first chipset. In 1978, the PUMA robot arm was released by Vicarm and Unimation, with support from General Motors. This arm was originally used in assembly lines and is still used today by researchers in robotics. Finally, OTC Japan released the first generation of dedicated arc welding robots in 1979. Industrial robotics then entered the age of modern robotics and have been implemented and developing rapidly since then. The most known types of

automation in the industry are the following: fixed automation, programmable automation and flexible automation.

The Effect of Automation on Human Jobs

The robotics revolution is rapidly accelerating, as fast-paced technological advances in automation, engineering, energy storage, artificial intelligence and machine learning converge. The far-reaching results will transform the capabilities of robots and their ability to take over tasks once carried out by humans. Already, the number of robots in use worldwide multiplied three-fold over the past two decades, to 2.25 million. Trends suggest the global stock of robots will multiply even faster in the next 20 years, reaching as many as 20 million by 2030, with 14 million in China alone.



Experts have predicted that existing business models in many sectors will be seriously disrupted and millions of existing jobs will be lost. With an estimated number of 20 million manufacturing jobs set to be lost to robots by 2030.

MAJOR COUNTRIES AND ORGANISATIONS INVOLVED

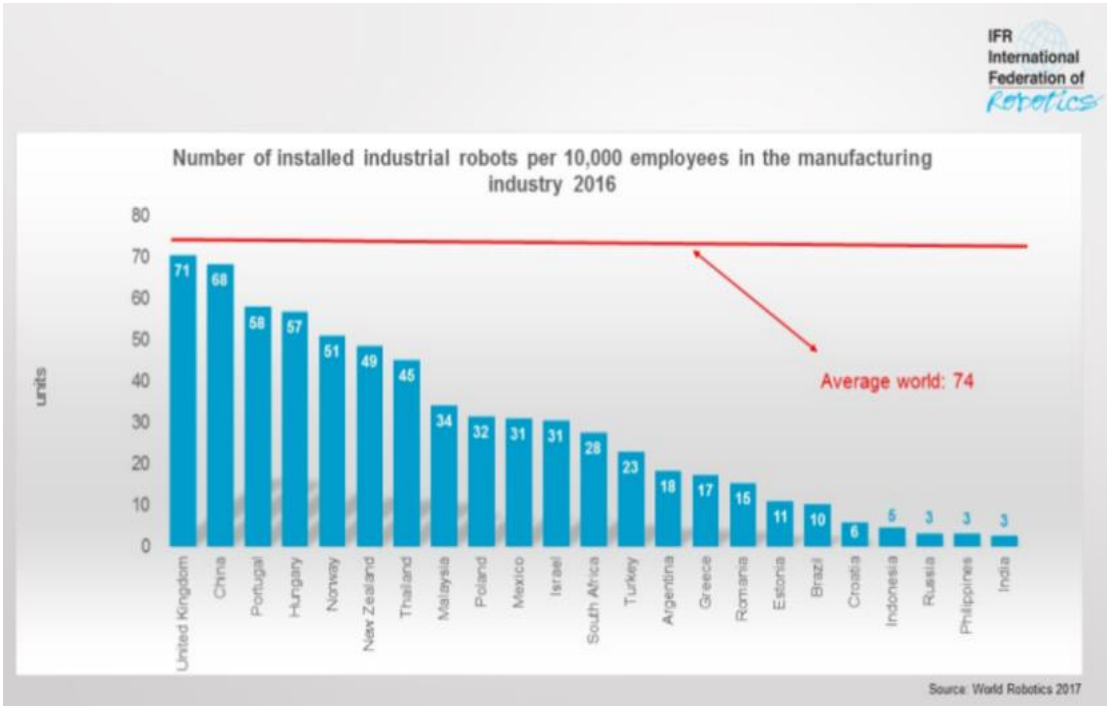
Japan

Japan is a global leader in the production of robots and factory automation systems (Hennessy Funds). In the top ten producers list globally, 5 of them are based in Japan and have

an estimated market share of 30%[12]. Thus, Japanese companies such as Fanuc -leading global manufacturer of factory automation systems-, Yaskawa Electric and Mitsubishi Electric are known for their high reputation in the global market. Nevertheless, like South Korea, its working age population is in decline so their dependence on automation and robotics is increasing day by day.

South Korea

As a leading country in automation and robotics, South Korea has the highest density of robot workers in the world with 631[13] robots per 10 000 employees (World Economic Forum). Each year, the Korean government is spending hundreds of millions of dollars to update and help automate its industries. Since South Korea's working age population is in decline, the government is embracing robots and automation technologies to reduce the need of human workers. On the other hand, the country's reliance on imported core machines and software is heavy, meaning that it falls behind more developed countries such as Japan and USA in automation technology.



[12] "Japan Leads the Factory Automation Revolution." Hennessy Funds, Hennessy Funds, Jan. 2021, https://www.hennessyfunds.com/insights/sector-highlight-japan-factory-automation.

[13] Smith, Rob. "South Korea Has the Greatest Density of Robot Workers." World Economic Forum, 18 Apr. 2018, https://www.weforum.org/agenda/2018/04/countries-with-most-robot-workers-per-human/.

China

As the second largest economy in the world, China has increased its industrial robots since 2014. In 2014 President Xi Jinping called for a "robot revolution" in manufacturing (Consumer News and Business Channel) in sight of the decline in countries' working population like the other Asian nations: South Korea and Japan. Thus, the Chinese government is supporting at any cost its local manufacturers with local and national government funding and policy support. To transform the nation into a world manufacturing power, the Chinese government has established a 10-year plan called "Made in China 2025".

Germany

In 2020, according to World Robotics, Germany is the most highly automated economy in the European Union[14]. Since the Covid-19 outbreak, the demand for robotic and automated solutions has increased in Germany. In some supermarkets and factories, the usage of robots is encouraged in sight of government restrictions to prevent the spread of the virus. Nonetheless, low-skilled workers in Germany also fear their jobs will eventually go to robots even after the pandemic ends because companies may see robots as more cost-effective for simple tasks (American Institute for Contemporary German Studies).

Singapore

In terms of installation of robots, Singapore is just behind South Korea with 488 robots per 10,000 employees (data provided from International Federation of Robotics) which makes it the second in lead. In addition, a recent study by Oxford Economics predicts that there will be 20 million robots in use by 2030 – 10 times[15] the number currently (Singapore Business Review).

International Federation of Robotics (IFR)

IFR is a non-profit organization established in 1987 to connect industries across the world in the topic of robotics and automation. Its aim is to promote the positive aspects of robots for productivity, competitiveness, economic growth and quality of work and life. Thus, annual reports of IFR provide worldwide market data, important statistics and studies in order to inform the policy makers and the public.

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[14] Flaherty, Nick. "Germany Tops EUROPEAN AUTOMATION LIST." EeNews Europe, 24 Sept. 2020, https://www.eenewseurope.com/news/germany-tops-european-automation-list.

[15] Shah, Manish. "Is Singapore Ready for the Rise of Robots and Automation?" LinkedIn, LinkedIn, 26 July 2019, www.linkedin.com/pulse/singapore-ready-rise-robots-automation-manish-shah.

United Nations Conference on Trade and Development (UNCTAD)

UNCTAD helps developing countries get more equitable and effective access to the benefits of a globalized economy while also assisting them in preparing for the probable negative consequences of further economic integration. They achieve this through doing research, facilitating consensus formation, and providing technical help. "Robots are threatening jobs in developed and emerging developing countries alike but, as with any new technology, there are opportunities as well as risks," said former UNCTAD Secretary-General Mukhisa Kituyi, launching the Trade and Development Report 2017: Beyond Austerity – Towards a Global New Deal.

TIMELINE OF EVENTS

Date	Description of Event
1946	Development of the electronic digital computer: the ENIAC
1940-1950	Numerical control (NC) is developed
1952	The first numerical control machine tool was demonstrated in the United States at MIT.
1954	The idea of the industrial robot was born
1950-1960	The development of the APT
1960s	The development of integrated circuits
1962	Manufacture of UNIMATE by Unimation
1969	Victor Scheinman invented the Stanford arm at Stanford University.
1975	ASEA developed the ASEA IRB, the first fully electrically driven robot.
1978	The PUMA robot arm was released by Vicarm and Unimation, with support from General Motors.
1979	OTC Japan released the first generation of dedicated arc welding robots.
1987	IFR is established.
2014	President Xi Jinping of China called for a "robot revolution" in manufacturing.

May 2015	The national strategic plan of China, Made in China 2025, is issued by Premier Li.

PREVIOUS ATTEMPTS TO SOLVE THE ISSUE

Since the rise of industrialized robots, the majority of developed countries have given importance to the development of automation and robotics. They started their experiments to manufacture robots by integration of circuits and creating control machines. Between 1950 and 2019, states such as South Korea, China, USA, Germany, Singapore and Japan have increased their investments on robot economy with the most recent one being the "Made in China 2025" by the Chinese government. It is a government led 10-year plan aiming for a dominant China in robotics and automation, meaning high-tech manufacturing. The program also aims to leverage government subsidies, mobilize state-owned companies, and track intellectual property acquisitions to capture and then surpass Western technological capabilities in advanced industries. Concerned sectors can be listed accordingly: electric cars and other new energy vehicles, next-generation information technology (IT) and telecommunications, advanced robotics, artificial intelligence, agricultural technology, aerospace engineering, new synthetic materials, advanced electrical equipment, emerging biomedicine, high-end rail infrastructure, and high-tech maritime engineering. Specific targets such as 70% self-sufficiency in high-tech industries can be found in this 10-year plan. In addition, politicians and security officials in the United States and other developed countries see China's attempts to become the dominant player in cutting-edge technology as a national security issue.

On the other hand, another significant advancement is the development of artificial intelligence (AI). AI is widely used in conjunction with machine learning and data analytics. Machine learning collects data and reveals major trends. If they discover something relevant to a practical problem, programmers can use that knowledge and use it to analyze specific problems. Furthermore, AI systems can learn and adapt as they make decisions. For example, in the field of transport, semi-autonomous vehicles are equipped with tools that allow drivers and vehicles to be aware of upcoming congestion, bumps, highway construction, or other potential roadblocks.

POSSIBLE SOLUTIONS

The rise of the Robots -as it is commonly called- will change the way that we perceive the economy, mostly because it will change the way the economy moves. Humans were trained (universities, private or public institutions, colleges) to do certain tasks, jobs, and in exchange for doing these tasks effectively, they earned a specific amount of money, but the past decade, robots are able to do those very same tasks, sometimes quicker and better than humans, have been made. That changes everything.

The aforementioned information is likely to cause questions. How will humans make a living? Will the existing jobs cease to exist? And many more…

Fact is that a big number of the existing jobs will be lost to robots by 2030. However, these changes are not necessarily bad, with the rise of the robot's productivity and economic growth will be boosted and so we will have the opportunity to create new jobs, open ourselves in new knowledge and "co-exist" with the progress of technology. For that to happen educational institutions and academic facilities have to start informing and teaching the generations of the future about: automation, AI, energy storage etc. Also, governments will have to come up with new economic plans and citizens will have to be informed about all changes concerning the future of their jobs.

In order to rise up to the challenge of automation and robot economy, we have to make the transition from humans working in business or jobs to these same things being automated. The creation of policies, new laws, economic developments and the adaptation of the population to the new changes, is substantial.

USEFUL LINKS

Robots and the Economy: The Role of Automation in Driving Productivity Growth

https://www.selectusa.gov/servlet/servlet.FileDownload?file=015t0000000kyXN

The threat of robots taking our jobs gets real

https://www.japantimes.co.jp/opinion/2020/05/21/commentary/japan-commentary/threat-robots-taking-jobs-gets-real/

From driverless cars to robotic warehouses, China looks to automation to get ahead of labor shortage

https://www.cnbc.com/2021/05/24/china-looks-to-automation-to-solve-population-issues.html

The Rise of Automation: How Robots May Impact the U.S. Labor Market

https://www.stlouisfed.org/publications/regional-economist/second-quarter-2019/rise-automation-robots

Is 'Made in China 2025' a Threat to Global Trade?

https://www.cfr.org/backgrounder/made-china-2025-threat-global-trade

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