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# Robotics and Human Resource Policy: Assessing its Relevance During the COVID-19 Pandemic and Implications for Public Policy and Development

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**Abstract**

COVID-19 pandemic has changed the world but negatively and positively. The pandemic let the introduction of robotic science into the production process. This was because of the sit-at-home policy, and the continuous need for work, especially in highly sensitive production processes. The consequences of this were to lay-off workers in these organizations. Their direct labour was replaced with robots. This paper examined the implication of this on human resource policy, public policy, and development. It is desktop research, which leverages secondary data. Content analysis is used to analyse data obtained for the study. From the literature examine, the study disclosed that not all robots operate autonomously—many require direct human supervision, and most are limited to simple, repetitive tasks. This, therefore, calls for human resource policies that encourage the organization to train their workers on how to complement this emerging technology, instead of laying off its workforce. This is the new direction for public policy and development.

**Keywords:** *Robotics, COVID-19, International economy, Artificial intelligence*

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**Background to the Study**

The world of work and production, from time immemorial, experienced certain transformations and changes in historical fiction. Thus, one cannot forget easily the industrial revolution in Great Britain, the middle decades of the 18th century-1700s, and the early 1800s. This saw a breakthrough in science and technology. Here machines did not just replace humans but accelerated the production process and productivity due to the shortage of time spent on production. Machines unlike humans were more efficient and faster in production, while at the same time caused the irrelevant of humans in factories, unleashing severe unemployment. The Encyclopedia Britannica informed that changes unleashed by the industrial revolution included the following:

1. The use of new basic materials, chiefly iron and steel,
2. The use of new energy sources, including both fuels and motive power, such as coal, the steam engine, electricity, petroleum, and the internal-combustion engine,
3. The invention of new machines, such as the spinning jenny and the power loom that permitted increased production with a smaller expenditure of human energy,
4. A new organization of work known as the factory system, which entailed the increased division of labour and specialization of function,
5. Important developments in transportation and communication, including the steam locomotive, steamship, automobile, airplane, telegraph, radio, and
6. The increasing application of science to industry. These technological changes made possible a tremendously increased use of natural resources and the mass production of manufactured goods (Encyclopedia Britannica; Resource Library; Chen, Mansa, and Schmitt, 2021).

Just as the above demonstrates, the extent to which the industrial revolution drastically in altering the world of work, in the 18th and early 19th centuries, so has robots penetrated the fabrics of work globally, mostly in developed states. This is evident in industries-medical, automobile, food, and other production spheres that engage the services of robots while unleashing the problem of retrenchment. As Scalera (2019) observed, industrial robotics is a branch of robotics that gained paramount importance in the last century. The presence of robots revolutionized the industrial environment in just a few decades beginning in the 1950s. Retrospectively its origin can be understood thus: the term "robot" is placed in more recent times: namely, it comes from the Czech word "robota", meaning "heavy work" or "forced labour".

The introduction of this term is due to the Czech writer Karel Čapek (1890-1938), who used it for the first time in 1920 in his novel "R.U.R.: Rossum's Universal Robots" (Čapek, 2004, in Scalera, 2019). On the other hand, the word "Robotics" was employed for the first time by Isaac Asimov (1920-1992) in his novel "Runaround" (1942), contained in the famous series "I, Robot". In that novel, he defined three rules concerning the behavior of robots and their interaction with humans: these rules would later be named the three Laws of Robotics (Asimov,1942 in Scalera,2019).

The first generation of industrial robots spans from 1950 to 1967. The robots of this generation were programmable machines that could not control the modality of task execution; moreover, they had no communication with the external environment. For the hardware, the first-generation robots were provided with low-tech equipment, and servo-controllers were not present (Wallen, 2008 Scalera, 2019). A peculiar feature of these robots is the strong noise they produced when their arms collided with the mechanical stops built to limit the movement of the axes (Scalera,2019). The industrial robots of the second generation (conventionally ranging from 1968 to 1977) were basic programmable machines with limited possibilities of self-adaptive behavior and elementary capabilities to recognize the external environment (Zamalloa, 2017, Scalera, 2019).

These robots used servo-controllers, which enabled them to perform both point-to-point motion and continuous paths as well. Their control system consisted of microprocessors or Programmable Logic Controllers (PLC), and they could be also programmed by an operator using a teaching box. To those belonging to the first generation, these robots could carry out more complex tasks (e.g., control of work centers). However, their level of versatility was not very high, because each robot had its software, which was dedicated to a specific task, (Scalera,2019). The industrial robots of the third generation (conventionally ranging from 1978 to 1999) were characterized by a larger extent of interaction with both the operator and the environment, through some kind of complex interfaces (such as vision or voice). They also had some self-programming capabilities and could reprogram themselves, although by a little amount, to execute different tasks (Zamalloa, 2017).

These robots were provided with servo controls and could execute complex tasks, by moving either from point to point or along continuous paths. They could be programmed either online (the operator could use a teaching box with a keyboard) or off-line, connected to a PLC or a PC, which allowed to use of a high-level language for motion programming and enabled the robots to be interfaced with a CAD or a database. The possibility of high-level, off-line programming enlarged the operational potential of the robots: for instance, they could elaborate data from sensor reading, to adjust the robot movements taking into account changes in the environment (e.g., changes in position and orientation of the workpieces), (Sacrela,2019).

The robots, though have been blamed for lots of displacement in the workplace by making human labor obsolete, were effective during the COVID-19 pandemic. The United Nations Department of Economic and Social Affairs reported that, with the fast technological advancement of recent years, computers are increasingly creeping into domains that were hitherto now, considered exclusively human. The astonishing progress in such areas as artificial intelligence (AI), robotics, 3D printing, and genetics has enabled computers to carry out the tasks of architects, medical doctors, music composers, and even a 16th-century Dutch master of painting. The Oxford Economics Publication reported that the upsurge in robots will boost productivity and economic growth. And it will lead to the creation of new jobs in yet-to-exist industries. But existing business models in many sectors will be seriously disrupted and millions of existing jobs will be lost. Estimating up to 20 million manufacturing jobs are set to be lost to robots by 2030. The report further state that, 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. The implications are immense, and the emerging challenges for policy-makers are equally daunting in scale.

The COVID-19 era, with its concomitant huge humanitarian cost, in the form of death, unemployment, ban on and movement restrictions via land, air, rail, and sea saw the world of work affected. This is so as both public and private establishments were shut down. This had a ripple effect of loss to the global economy, supply chain, and loss of jobs. The entire global economy sectors were strangulated: aviation, tourism, sports, automobile, cinema, small and medium scales businesses, supermarkets, malls, food markets, etc. billions of dollars were lost. Organizations whose workers were observing the lockdown, witnessed dwindling productivity. To keep industries functioning, robots were employed and relied on by industries and firms, mostly in the automobile and medical industries. The paper examines the extent to which the COVID-19 pandemic caused a shortage of human labour at the workplace as a result of lockdown and sit-at-home policy and the implications for public policy and development.

**Statement of the Problem**

The world of work has been, truncated by several constellations of forces. As pointed out earlier, the industrial revolution affected human labor in several ways due to the invention of machines, as also will be shown by the COVID-19 pandemic. The Covid-19 pandemic, as observed by Ebaye, Duke, and Bassey (2021a) remains a non-military threat that has wreaked havoc on humanity like war. In the same vein, Nkang and Bassey (2022), observed that "the COVID-19 pandemic, a devastating global health security challenge, ravaged the entire globe in a catastrophic proportion, leaving no nation spared, (Ebaye, Duke and, Bassey,2021b). The death toll, unemployment, stretching of the nation's health systems, and reduction in the global supply chain, were unbearable leading to protests, and violent civil unrest".

With such a scenario where preventive measures-lockdown, sit-at-home, closure of business, firms, public and private establishments, curfews, etc, (Udoh, Bassey, Nkang and Abigail, 2022) were inevitable, hence humans could not go to work. The robot became a means of sustenance to firms, workplaces, and even medical and clinical services opted for robots as an alternative. Such robots' travail has not been given due attention as regards its role in augmenting the gap left by humans in workplaces during COVID-19. Many scholars on the intellectual spectrum in extrapolating the issues on COVID-19 have mainly focused on health, socio-economic, human security, global security, etc. but little intellectual prowess has been invested in how robots have played labour role in the global world of work in augmenting for human workforce during the COVID-19 era. Thus, many scholars have focused mainly on the negative part of robots mostly making humans irrelevant and obsolete, retrenchment, etc.

The adverse effects of robots have been documented by scholars. As eloquently captured by Dzieza (2020), the robots are watching over hotel housekeepers, telling them which room to clean and tracking how quickly they do it. They're managing software developers, monitoring their clicks and scrolls and docking their pay if they work too slowly. They're listening to call center workers, telling them what to say, how to say it, and keeping them constantly, maximally busy. While we've been watching the horizon for the self-driving trucks, perpetually five years away, the robots arrived in the form of the supervisor, the foreman, and the middle manager. The utilization of artificial intelligence determines strong movements in labour demand in both the short- and long-term. Also "the rapid advances in artificial intelligence and automation technologies have the potential to significantly distort labour markets". The critical issue is the reduction in demand for different jobs and the loss of professional status is more important than the loss of wages. Otherwise, in the long-term, technological change is expected to potentiate human skills via newly created jobs. Artificial intelligence creates new ways to take advantage of human skills, (Frank et al, 2019; Stevenson, 2019, Dzieza, 2020). Galoen and Hauser (2017) opined that "Machines are on the rise. While they aren't out to get you just yet — and might never be — they are already gunning for one thing: your job. If you work in the transportation industry, manufacturing, some sectors of the information technology industry, and maybe even in insurance, law, or taxation, you may already be obsolete".

The level of global employment downturn, industrial production loss due to a reduction in labour as a result of workplace shutdown, etc. leaves one to appreciate what role robots play during this period. Fleming (2021), opined that the equivalent of 255 million full-time jobs was lost around the world due to the pandemic, according to data from the International Labour Organization. The economic pains inflicted on the global economy in 2020 were "far deeper" than the one seen in 2009, following the global financial crisis. The effects have been felt all around the world. In April 2020, the US experienced its highest rate of unemployment (14.8%) since records began. The International Trade Center, (2022), narrates the poor labor turnover in Togo, while the impact of the crisis varies between sectors, a drop in sales stands out as the biggest problem experienced in most Togolese companies. From January to February 2020, while not a single case of COVID-19 had been detected in Togo, almost 54% of the companies surveyed had experienced a drop in their turnover as a result of a decrease in commercial transactions between local businesses and affected countries. This percentage almost doubled between February and March, when 93% of the companies questioned recorded a decline in turnover.

Hatayama and Pela (2022) affirmed that, in the nascent days of the COVID-19 pandemic, as massive closure began, some observers predicted that the risk of joblessness depends on factors such as an occupation's amenability to working remotely, or contractions in aggregate demand and downturns in contact-intensive sectors like restaurants and travel. As the crisis has worn on, however, some less anticipated drivers of job losses have been revealed. First, whereas declining labor supply is a big story in rich economies, a new Jobs Group study shows that shocks to labor demand have been the predominant source of job losses in the middle-income economies (MICs) of Georgia and Jordan. As occurred in Georgia, the primary causes of declines in labor demand are also becoming obvious. As anticipated, infection risk to customers has played a role as have COVID-related closures and falling export demand. Yet less expected is that supply chain disruptions are also among the most significant determinants of job losses. In addition to the cases of Georgia and Jordan, a survey of Asian countries shows that firms more able to rearrange their supply chains did better during the COVID-19 Pandemic.

These assessments on job loss and retrenchment due to COVID-19 lockdown and closure create a concern for policy makers and development experts. Industries in most developed economies adopted artificial intelligence and robotics in the production processes and this affects labour management. The experience has changed the dynamics of the workplace. This study tries to examine this trend, drawing up policy implications and lesson for development.

**Objectives of the Study**

The general objective of the study is to examine the implication of COVID-19 on human resource policy. Specifically, the study will assess,

1. The impact of COVID-19 on the world economy and reduction in labour related activities in the workplace.
2. Arguments for and against the use of robots in the world economy.
3. Explain the role of robots as a workforce during COVID-19.
4. The implication of this trend to policy experts and development.

**Conceptual clarifications**

**COVID-19**

According to the World Health Organization, a disease (COVID-19) is an infectious disease caused by the SARS-CoV-2 virus. Most people infected with the virus will experience mild to moderate respiratory illness and recover without requiring special treatment. However, some will become seriously ill and require medical attention. Older people and those with underlying medical conditions like cardiovascular disease, diabetes, chronic respiratory disease, or cancer are more likely to develop serious illnesses. Anyone can get sick with COVID-19 and become seriously ill or die at any age. The African Centre for Disease Control and Prevention informed that the coronavirus disease 2019 (COVID-19) is a communicable respiratory disease caused by a new strain of coronavirus that causes illness in humans. Cennimo (2022) is of the view that Coronavirus disease 2019 (COVID-19) is defined as an illness caused by a novel coronavirus called severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2; formerly called 2019-nCoV), which was first identified amid an outbreak of respiratory illness cases in Wuhan City, Hubei Province, China. It was initially reported to the WHO on December 31, 2019. On January 30, 2020, the WHO declared the COVID-19 outbreak a global health emergency. On March 11, 2020, the WHO declared COVID-19 a global pandemic, its first such designation since declaring H1N1 influenza a pandemic in 2009.

**Robotics**

The Encyclopedia Britannica defines robots as, the design, construction, and use of machines (robots) to perform tasks done traditionally by human beings. Robots are widely used in such industries as automobile manufacturing to perform simple repetitive tasks, and in industries where work must be performed in environments hazardous to humans. Many aspects of robotics involve artificial intelligence; robots may be equipped with the equivalent of human senses such as vision, touch, and the ability to sense temperature. Some are even capable of simple decision-making, and current robotics research is geared toward devising robots with a degree of self-sufficiency that will permit mobility and decision-making in an unstructured environment. Today's industrial robots do not resemble human beings; a robot in human form is called an android.

These exaggerated, humanoid concepts of robots usually seem like a caricature of the real thing…or are they more forward-thinking than we realize? Robots are gaining intellectual and mechanical capabilities that don't put the possibility of an R2-D2-like machine out of reach in the future. A robot is the product of the robotics field, where programmable machines are built that can assist humans or mimic human actions. Robots were originally built to handle monotonous tasks (like building cars on an assembly line), but have since expanded well beyond their initial uses to perform tasks like fighting fires, cleaning homes and assisting with incredibly intricate surgeries. Each robot has a differing level of autonomy, ranging from human-controlled bots that carry out tasks that a human has full control over to fully-autonomous bots that perform tasks without any external influences

**Theoretical Framework**

**Robotic theory of Service Implementation**.

According to Belanche, et al. (2020), the emergence of service robots has attracted great attention within academia, and many researchers have clarified the impacts of service robots. However, existing studies only consider the results of the service process without considering how robots affect service quality through their influence on the service process. For example, Belanche et al (2020) suggested that robot design and service encounter characteristics resulted in customer satisfaction and loyalty to the service provider. While they identified some key factors, they did not elaborate on how these factors play a role in the service process. Research and practice have also proven that the application of service robots affects different service roles in different ways.

This study construes the service robot as a service contact device based on systematic, intelligent, autonomous, and adaptive technology, one that can interact with the organization's customers in a humanoid way (e.g., appearance, action, and communication) to complete various service functions to play the role of a service provider in the service delivery chain. This definition emphasizes that a service robot is an intelligent technical device designed by manufacturers. Since robots can provide service to customers in a humanoid way, they can be used to fill a variety of service labor roles previously undertaken only by human beings (Zang et al.2022).

The input and utility of the theory, to the study, buttress the fact that robots as depicted in this study are more of the service provider in times of global public health emergency such as Covid-19. As many jobs were lost and workers observed the lockdown and sit-at-home policy in containing the Covid-19 pandemic spread. Many industries experienced poor labor turnover and a decline in productivity. So, such inconveniences prompted the service of robots that performs jobs faster, cheaper, and more accurate than humans. The Robots were immune from Covid-19. Robots became another means of augmenting the lacuna created by humans. The automobile industries continue to employ the services of robots.

**Impact of COVID-19 on the world economy and reduction in labour related activities in the workplace**

The COVID-19 pandemic, though a global health security issue cum pandemic, has caused unbearable twists and trauma in every sphere of human existence: politically it has led to the cancellation of elections, exposes the government's insensitivity to human rights evident in high-handedness in enforcing lockdown, sit-at-home, curfew, etc. socially, leading to restrictions on rights to free movement, travel, worship, civil unrest, unlawful detention, sports, and athletics canceled, economy, supply chains have been halted, job loss, company retrenched workers, poverty and malnutrition increased, etc. The World Health Organization, European Union, many international organizations, and statesmen have tagged the COVID-19 pandemic as a global catastrophe, with an effect similar to world wars and the great depression.

According to Shereen and Siddique (2022), Coronavirus disease 19 (COVID-19) is a highly transmittable and pathogenic viral infection caused by severe acute respiratory syndrome corona virus 2 (SARS-CoV-2), which caused a global pandemic that led to a dramatic loss of human life worldwide. Recently at the end of 2019, Wuhan an emerging business hub of China experienced an outbreak of a novel corona virus that killed more than eighteen hundred and infected over seventy thousand individuals within the first fifty days of the epidemic. This virus was reported to be a member of the β group of corona viruses. The novel virus was named 2019 novel corona virus (2019-nCov) by Chinese researchers. The International Committee on Taxonomy of Viruses (ICTV) named the virus SARS-CoV-2 and the disease COVID-19 (Shereen & Siddique, 2022).

In its history, SRAS-CoV (2003) infected 8098 individuals with a mortality rate of 9%, across 26 countries in the world, on the other hand, novel corona virus (2019) infected 120,000 individuals with a mortality rate of 2.9%, across 109 countries, till the date of this writing. It shows that the transmission rate of SARS-CoV-2 is higher than SRAS-CoV and the reason could be genetic recombination event at S protein in the RBD region of SARS-CoV-2 may have enhanced its transmission ability (Shereen and Siddique, 2022).

World Health Organization publication of February, 12, 2020 reported that on 30 January 2020 following the recommendations of the Emergency Committee, the WHO Director-General declared that the outbreak constitutes a Public Health Emergency of International Concern (PHEIC). Over the first 6 weeks of the new decade, the novel corona virus, known as COVID-19, has spread from the People's Republic of China to 20 other countries. The European Union affirmed that, at the 74th session of the World Health Assembly (WHA), which took place from 24 May to 1 June 2021, the EU led efforts to promote a multilateral response to the pandemic and prepare better for future health emergencies. Beyond the EU vaccination plan, which started on 27 December 2020, the European Union is committed to ensuring that everyone who needs a vaccine gets it, anywhere in the world and not only at home. The EU is one of the leading donors to support the COVAX Facility, a global collaboration aiming to secure access to the COVID-19 vaccine in low and middle-income countries. Since the first deliveries of vaccines started to take place in February 2021, the EU and the Member States have sent 1.4 billion doses to more than 150 countries.

The United Nations Department of Economic and Social Affairs reported that nearly 90 percent of the world economy has been under some form of lockdown, disrupting supply chains, depressing consumer demand, and putting millions out of work. Under the baseline scenario, the developed economies are expected to contract by 5.0 percent in 2020, while the output of developing countries will shrink by 0.7 percent. Against the backdrop of a devastating pandemic, the global economy is projected to contract sharply by 3.2 percent this year, according to the United Nations World Economic Situation and Prospects (WESP) mid-2020 report, released today. The global economy is expected to lose nearly $8.5 trillion in output over the next two years due to the COVID-19 pandemic, wiping out nearly all gains of the previous four years (Shereen & Siddique, 2022).

The sharp economic contraction, which marks the sharpest contraction since the Great Depression in the 1930s, comes on top of anemic economic forecasts of only 2.1 percent at the start of the year. The report estimates that GDP growth in developed economies is expected to plunge to -5.0% in 2020. A modest, 3.4% growth – barely enough to make up for the lost output – is expected in 2021. World trade is forecast to contract by nearly 15 percent in 2020 amid sharply reduced global demand and disruptions in global supply chains. For the Asian continent, the World Economic Forum publication informed that the corona virus pandemic may have pushed as many as 80 million people in developing Asia into extreme poverty last year, threatening to derail progress on global goals to tackle poverty and hunger by 2030, the Asian Development Bank (ADB) said on Tuesday.

Developing Asia's extreme poverty rate - or the proportion of its people living on less than $1.90 a day - would have fallen to 2.6% in 2020 from 5.2% in 2017 without COVID-19, but the crisis likely pushed last year's projected rate higher by about 2 percentage points, ADB simulations showed. As for Africa, the Organization for Economic Corporation and Development reported that Africa recorded its first COVID-19 case in Egypt on 14 February 2020. Since then, 52 countries have reported cases. Initially confined to capital cities, cases are now reported in a significant number of countries, and multiple provinces. On 4 May 2020, the number of confirmed COVID-19 cases had risen to 44 873 and caused 1 807 deaths. The African countries with the highest number of infections at the time of writing this paper are South Africa, Egypt, Morocco, and Algeria. However, the full scope of the pandemic remains uncertain, as cases are underreported and the accuracy of data collection varies considerably (Shereen & Siddique, 2022).

On 17 April, the World Health Organisation (WHO) warned that Africa could be the next epicenter of the Coronavirus. In the WHO best-case scenario, where governments introduce intense social distancing, once a threshold of 0.2 deaths per 100 000 people per week is reached, Africa would see 122 million infections, 2.3 million hospitalizations, and 300 000 deaths. On 7 May, a new study by the WHO Regional Office for Africa estimated up to 190 000 people could die in the first year of the pandemic if containment measures fail.

The International Labour Organization (ILO) (2020), reported that an initial assessment of the impact of COVID-19 on the global world of work says the effects will be far-reaching, pushing millions of people into unemployment, underemployment, working poverty, and proposes measures for a decisive, coordinated and immediate response. Falls in employment also means large income losses for workers. The study estimates these as being between USD 860 billion and USD 3.4 trillion by the end of 2020. This will translate into falls in the consumption of goods and services, in turn affecting the prospects for businesses and economies. Cotofan, Deneve, Gorin, Kaats, and Ward (2021) also argued that, as of January 2021, more than 90 percent of the world's workforce lived in countries where business closures were still in place for at least some economic sectors. Unemployment has also increased in many countries affected by the COVID-19 crisis, though unemployment figures alone do not capture the full extent of the labour market impact for two primary reasons.

1. First, many workers who have suffered job losses during the COVID-19 pandemic are not actively looking to find new jobs, and are therefore classified as "inactive" or "out of the labour force" in official statistics. Increases in inactivity have outpaced increases in unemployment in a majority of countries.
2. Second, even while still in paid work, many workers have had to reduce their working hours as a result of the pandemic. Therefore, looking at declines in total hours worked offers a complete picture of the labour market impact of the crisis. According to the International Labour Organization (ILO), global working hours declined by 17.3 percent in the second quarter of 2020. This is equivalent to 495 million full-time jobs lost. These dramatic reductions in working hours have been accompanied by equally dramatic reductions in income. Global labour income declined by 8.3 percent in 2020, amounting to a loss of USD 3.7 trillion, or 4.4 percent of Global GDP (ILO, 2020).

**Arguments for and against the use of robots in the world economy**

Many research analysts and international relations experts in spheres of economic and security parlance have presented narrating their diverse views on robotics. Some critiques debunk any positivity associated with robotics, claiming it has caused a severe increase in unemployment. This idea is born out of the reason that, a robot is more efficient, cheap, and easy to produce than a human, making many firms reduces the relevance of human labour.

According to Atkinson, (2019) companies around the world are increasing their use of robots. According to the International Federation of Robotics (IFR), the global average for industrial robots per 10,000 manufacturing workers grew from 66 in 2015 to 85 in 2017. With the integration of artificial intelligence and other improvements in robotics (e.g., better machine vision, better sensors, etc.), robotics promises to see significantly improved pricing and performance over the next decade. Atkinson further affirmed that faster productivity growth in many functions and industries that involve moving or transforming physical things will be spurred by better and cheaper robots. Robots are already driving productivity (Atkinson, 2019).

Bandholz (2016) noted that investment in robots contributed to 10 percent of GDP growth per capita in Organization for Economic Cooperation and Development (OECD) countries from 1993 to 2016, and there is a 0.42 correlation between a country's wage-adjusted manufacturing robot adoption and growth in productivity between 2010 and 2016. Graetz and Michaels (2018) found that robot densification increased the annual growth of GDP and labor productivity between 1993 and 2007 by about 0.37 and 0.36 percentage points respectively across 17 countries studied, representing 10 percent of total GDP growth—compared with the 0.35 percentage point estimated total contribution of steam technology to British annual labor productivity growth between 1850 and 1910. A subsequent study by them found that investment in robots contributed 10 percent of the growth in GDP per capita in OECD countries from 1993 to 2016. The same study found that a one-unit increase in robotics density (which the study defines as the number of robots per million hours worked) is associated with a 0.04 percent increase in labor productivity (Bandholz, 2016).

A study by the Institute for Employment Research (2018) found that robot adoption led to a GDP increase in Germany of 0.5 percent per person per robot over 10 years from 2004 to 2014.8 Koch, Manuylov, and Smolka (2020) found that the introduction of industrial robots in Spanish manufacturing firms boosted output by 20 to 25 percent within four years, and reduced labor-cost share by approximately 6 percent. In the same vein, Atkinson (2019) opined that improving productivity in many functions and industries that involve moving or transforming physical things will depend on much better and cheaper robots. To be sure, robots are already driving productivity. Investment in robots contributed 10 percent of the growth in GDP per capita in Organization for Economic Cooperation and Development (OECD) countries from 1993 to 2016 (Bandholz, 2016).

Pires (2021), opined that robot are extensively used in large-volume market industries (like automotive and consumer electronics) to execute all sorts of operations. Consequently, robotics development was mainly spurred by the needs of these high-volume industries, which resulted in machines and systems less adapted to the needs of smaller, knowledge-based and innovation-driven businesses. Pires further stated that those companies, which constitute the vast majority of the European industrial tissue in terms of turnover and employment, require fewer complex systems, are easier to program and operate by non-skilled operators, much more flexible and agile. And this means radical new approaches in the design, development, distribution, and support of future robotic systems (Pires, 2021).

Stojkovic (2017) disclosed that in the educational sector, the use of robots in the classroom introduces students to possible career paths they may have never considered. In addition, robotics is a perfect way to show students that engineering and IT can be fun by making abstract knowledge concrete. Working with robots enhances creative problem-solving techniques and encourages the development of basic communication and interpersonal skills as well as the ability to collaborate and convey complex ideas to fellow students or colleagues.

Shearer (2018) argued that it's estimated that by 2019 the spending on robotics and related services will hit 135.4 billion US dollars. The types of technology we are talking about specifically for education will make up a very small fraction of this the two fastest growing industries for robotics are healthcare and unsurprisingly process manufacturing (Shearer, 2018).

Robotics has become part and parcel of human existence in global, political, economical, technological, and scientific spheres of International Affairs. The outright disdain and negative thoughts about robots have not been able to bring a reduction in their usage. The International economy is experiencing the more invention of robotics in areas of security, health, education, domestic living, automobile industries, etc.

On the negative side, there are some concerns on the use of robots. Brown (2019) stated that industrial robots harm workers. The researcher discovered that for every robot added per 1,000 workers in the U.S., wages decline by 0.42% and the employment-to-population ratio goes down by 0.2 percentage points — to date, this means the loss of about 400,000 jobs. The impact is huger within the areas where robots are deployed: adding one more robot in a commuting zone (geographic areas used for economic analysis) results in to drop in employment by six workers in that area. Improvements in technology adversely affect wages and employment through the displacement effect, in which robots or other automation complete tasks formerly done by workers. Technology also has more promising productivity effects by making tasks easier to complete or creating new jobs and tasks for workers.

He noted further that automation technologies always create both displacement and productivity effects, but robots create a stronger displacement effect (Brown, 2019). Robots are most likely to affect routine manual occupations and lower and middle-class workers, and particularly blue-collar workers, including machinists, assemblers, material handlers, and welders. Both men and women are affected by the adoption of robots, though men are slightly more. For men, impacts are seen most in manufacturing jobs. For women, the impacts were seen most in non-manufacturing jobs. Bandholz (2016) added that the number of robots being used by businesses to boost productivity has increased rapidly in recent years and this poses a problem on human resource management. While the rise of robots will boost productivity and economic growth, human relations, empathy, motivation and inter personal relationship is lost. These features are important in the organizational performance.

**Robotics and the world of work during the COVID-19 pandemic**

According to Caselli, Fracasso, and Traverso (2021), in the discussion on how new technologies can improve the safety of working environments and help protect workers from infection, robots feature as one of the most prominent solutions (Abdel-Basset, Chang, Nabeeh, 2021, Brakman, Garretsen, van Witteloostuijn, 2021, Zeng, Chen, Lew, 2020 in Caselli, Fracasso, & Traverso, 2021). Robots, which can perform a variety of tasks that could previously be done only by humans, are immune to viruses and therefore, the reasoning goes, increasing their presence in the workplace might reduce the risk of infection by reducing the occasions of physical contact among workers. For example, fast-food chains have tested the introduction of robots as cooks and servers, and warehouses have increased the use of robots to sort and pack. While reasonable, this risk-mitigating effect of robots has been taken for granted so far, and no empirical test on its validity has been performed yet.

The Danish company Universal Robots, one of the leaders in the production of collaborative robots, described its products as affordable and effective solutions to the volatile, uncertain, complex, and ambiguous (VUCA) conditions that COVID-19 created, 10 and recorded high rates of growth in sales in early 2021 (Caselli, Fracassoand Traverso,2021). In the same Wavelength, Yang, Nelson, and McNutt, (2020), argued that robots have the potential to be deployed for disinfection, delivering medications and food, measuring vital signs, and assisting border controls. As epidemics escalate, the potential roles of robotics are becoming increasingly clear. During the 2015 Ebola outbreak, workshops organized by the White House Office of Science and Technology Policy and the National Science Foundation identified three broad areas where robotics can make a difference: clinical care (e.g., telemedicine and decontamination), logistics (e.g., delivery and handling of contaminated waste), and reconnaissance (e.g., monitoring compliance with voluntary quarantines). Many of these applications are being actively explored in China, although in limited areas, and many as proofs of concept.

Caselli, Fracasso, and Traverso, further reiterate that, for disease prevention, robot-controlled noncontact ultraviolet (UV) surface disinfection is being used because COVID-19 spreads not only from person to person via close contact respiratory droplet transfer but also on contaminated surfaces. Corona viruses can persist on inanimate surfaces—including metal, glass, or plastic—for days, and UV light devices (such as PX-UV) are effective in reducing contamination on high-touch surfaces in hospitals. Instead of manual disinfection, which requires workforce mobilization and increases exposure risk to cleaning personnel, autonomous or remote-controlled disinfection robots could lead to cost-effective, fast, and effective disinfection (Caselli, Fracasso, and Traverso 2021). For initial diagnostic testing for COVID-19, most countries recommend collecting and testing nasopharyngeal and oropharyngeal swabs. This involves sample collection, handling, transfer, and testing. During a major outbreak, a key challenge is a lack of qualified staff to swab patients and process test samples. Automated or robot-assisted nasopharyngeal and oropharyngeal swabbing may speed up the process, and reduce the risk. COVID-19 could be a catalyst for developing robotic systems that can be rapidly deployed with remote access by experts and essential service providers without the need of traveling to the front lines. Widespread quarantine of patients may also mean prolonged isolation of individuals from social interaction, which may harm mental health. To address this issue, social robots could be deployed to provide continued social interactions and adherence to treatment regimes without fear of spreading disease, (Caselli, Fracasso, & Traverso 2021).

The EHL Faculty report (2020) informed that, in hospitals, handling COVID-19 can be difficult. People who are positive for the virus need to receive treatments, but it is not always easy for health care assistants to do so without putting themselves in danger. A safe alternative is to use robots. In this case, robots are used to disinfect the air and surfaces, answer patients' questions, bring them medicine or food, and monitor them. Guizzo and Klett,(2020), trenchantly observed that, as the corona virus emergency exploded into a full-blown pandemic in early 2020, forcing countless businesses to shutter, robot-making companies found themselves in an unusual situation: Many saw a surge in orders. Robots don't need masks, can be easily disinfected, and, of course, they don't get sick. The duo further affirmed that "an army of automatons has since been deployed all over the world to help with the crisis: They are monitoring patients, sanitizing hospitals, making deliveries, and helping frontline medical workers reduce their exposure to the virus" (Guizzo and Klett, 2020).

**Conclusion and the implication of this trend to human resource policy and development**

The experience of COVID-19 brought change to life style and human organization. The use of robots in the organisation is one of the experiences brought in by the pandemic. This unprecedented change poses a challenge for human resource policies in the organization. It should be stressed that not all robots operate autonomously—many require direct human supervision, and most are limited to simple, repetitive tasks. This therefore calls for human resource policies that we encourage the organization to train their workers on how to compliment this emerging technology, instead laying-off its workforce. This is the new direction for public policy and development.

**References**

Abdel-Basset, M., Chang, V., & Nabeeh, N. A. (2021). An intelligent framework using disruptive technologies for COVID-19 analysis, *Technol. Forecasting Social Change. ;16* (3), 120-431. [PMC free article] [PubMed] [Google Scholar]

African Centre for Disease Control and Prevention (2019). *Coronavirus disease 2019 (COVID-19)*

Atkinson, D. (2019). *Robotics and the future of production and work*, The Information Technology and innovation Foundation

Atkinson, R. (2019). Robots and international economic development, January 2019 Georgetown *Journal of International Affairs* 20(1):170-178.DOI:10.1353/gia.2019.0008

Bandholz, H. (2016). *The economic and social consequences of robotization*, Published in jobs and development. The World Bank Blogs

Belanche, D., Casaló, L.V., Flavián, C., & Schepers, J., (2020). Service robot implementation: A theoretical framework and research agenda*, Serv, Ind. Journal 40*, 203–225. [Google Scholar] [CrossRef]

Brown, S. (2020). *A new study measures the actual impact of robots on jobs*, It'ssignificant.The MIT management Sloan school.

Bultin.Com (2022). *Robotics. What are robots? types & Uses of Robots*.

Cennimo, J. D. (2022). *Coronavirus disease 2019 (COVID-19).Medicine,* Medscape

Cotofan, M., Deneve, J., Golin, M., Kaats, M. & Ward, G. (2021).Work and well-being during COVID-19: Impact, Inequalities, Resilience, and the Future of Work

Dzieza, J.(2020). *How hard will the robots make us work? the Verge*, Com.

Ebaye, E. N, Duke, O. O. & Bassey, B. O. (2021). Globalisation & the Covid-19 Pandemic: A threat to global security, International Journal of Social Sciences and Humanities Reviews 11 (2), 1 – 12 (ISSN: 2276-8645).

Ebaye, S. N, Duke, O. O. & Bassey, B. O. (2021). COVID-19 & its implication on the socio-economic development of Nigeria, *Global Journal of Applied, Management and Social Sciences (GOJAMSS), 20*, 254 – 263 (ISSN: 2276 – 9013

Guizzo, E. & Klett, R. (2020). *How robots became essential workers in the COVID-19: Response autonomous machines proved their worth in hospitals*, offices, and on city streets. IEEE Spectrum.

EHL Faculty Report, (2020). *Hospitality news & business insight*, Encyclopedia Britannica. Robotics

Fleming, F. (2021*). The pandemic has damaged youth employment: Here's how we can help*, The World Economic Forum.

Frank, M. R. et al.(2019). *Toward understanding the impact of artificial intelligence on labor*, Edited by J. A. Scheinkman at Columbia University, New York

Galeon, D & Hauser, K. (2017). *Experts: Because of ai, millions of people are at risk of unemployment*, TheFuturism.Com. Publication

Health Organization, February 12, (2020). *COVID-19 public health emergency of International concern (PHEIC) Global research and innovation for*um, Industrial Revolution by the Editors of Encyclopaedia Britannica Edit History

Industrialization, Labor, and Life Chen, J, Mansa, J, & Schmitt, R. M. (2022). *Industrial revolution*. Investopedia.Com

International Trade Center, (2022). The COVID-19 crisis causes a loss of turnover for almost all Togolese companies*. The Blog Storie*

Labour Organization, (2020). COVID-19: Protecting workers in the workplace: Almost 25 million jobs could be lost worldwide as a result of COVID-19, says ILO.

Nkang, N. O. & Bassey, B. O. (2022). Securitization of global health pandemic and reiterating the relevance of 2005 international health regulations: COVID-19 and human security in Africa, *African Journal of Empirical Research, 3* (1), 36-48

Organization for Economic Corporation and Development, (2020).COVID-19 and Africa: Socio-economic implications and policy responses.

Osborne, T, Hatayama, H. & Pela, K. (2022).What we've been reading about job losses due to COVID-19, *The World Bank Blogs* , February 28,2022.

Oxford Economics, (2019). How Robots Change the World.

Pires, N. J. (2011). Productive robotics in Europe: evolution, trends and challenges. *Journal of, Industrial Robot, 38* (1). https://doi.org/10.1108/ir.2011.04938aaa.003

Oxford Economy Report (2019).How Robots Change the World Proc. Natl. Acad. Sci. USA Resource Library Article.114

S.id, G. H., Van-Witteloostuijn, A. (2021). Robots do not get the coronavirus: The COVID-19 pandemic and the international division of labor, *J. Int. Bus. Stud.*:1–10. [PMC free article] [PubMed] [Google Scholar].

Shearer, S. (2018). *Are robots the future of education?. The Ability Net*.Com

Shereen, A. M. & Siddique, R. (2020). COVID-19 infection: Emergence, transmission, and characteristics of human coronaviruses, *Journal of Advance Research*. 91-98.https://doi.org/10.1016/j.jare.2020.03.005technology.

Stojkovic, A. (2017). *The use of robotics in education: The European Union External Action.Coronavirus: EU action, vaccines*, Team Europe support, Disinformation, Repatriation and Solidarity Stories

The world Economic Forum (2021). Has COVID-19 stopped Asia-Pacific from reaching its global development goals? *Experts explai*n.

Udoh, E., Bassey, B. O, Nkang, N. O. & Abigail, A. O. (2022). COVID-19 Measures and global civil unrest: A human right-based approach in Africa, *Academic Journal of Education, Social Sciences & Humanities. 6* (2)

*United Department of Economic and Social Affair*s. Will robots and AI cause mass unemployment? Not necessarily, but they do bring other threats

United Nations Department of Economic and Social Affairs. COVID-19 to slash global economic output by $8.5 trillion over next two years

World Health Organization, (2022). *Coronavirus disease (COVID-19*)

Yang, G., Nelson, R. & McNutt, M. (2020). *Combating COVID-19—the role of robotics in managing public health and infectious diseases*. Science Robotics. Issue 40 vol.5.https://doi.org/10.1126/scirobotics.abb558.

Zang, S., Huang, C, Li, X. & Ren, A. (2022). Understanding Impact of Service Robot with Gap. Impact *Journal of sustainability*, 14. (5)

Zeng, Z., Chen, P. J., & Lew, A. A. (2020). *From high-touch to high-tech: COVID-19 drives robotics adoption. Tourism Geogr, 22*(3), 724–734. [Google Scholar]