



Commission: **International Labour Organisation (ILO)**

Subject: **Does technology help or hinder working conditions?**

Presidency: **Karen Thorsen and Cameron White**

## **Introduction**

Technology is an inherent part of our lives; it has changed the daily life of humans worldwide. For instance, one of its most global and essential uses is for bank transfers in LEDCs and MEDCs. Technology has also challenged many thinkers such as David Ricardo, who discussed the disruptive effects of machinery in *Principles* in 1821.

How is technology used? It can provide many advantages. One of these for instance is that it can assist in rendering work more efficient, supporting certain economic activities via online shopping, grocery deliveries, travel agents, promoting instant communication for work via email, cloud computing, video conferencing. Its advantages also extend to multiple other purposes like education (online classes), finance (electronic payments), entertainment (online gaming), recreational (genealogy research) and cultural activities (museum visits) etc.

However, technology can also lead to challenges. One of these can be for instance economic issues due to short term job loss, with long term consequences and leading to higher productivity without proper compensation and deterioration of working conditions. Security issues is also a central point, as technology can lead to undisclosed monitoring of workers, cyber-bullying, and lack of privacy. Technological issues related to security can also lead to psychological stress, such as those experienced by the “always on” generation with longer working hours and no more designated working hours, or dependency leading to ongoing connection due to FOMO (fear of missing out). These all lead to physical and psychological disorders amongst others.

In the past few months and years, we have seen a stark rise in the number of popular uprisings. As United Nations States, it is our duty to find solutions to the problem of individuals losing their jobs, directly or indirectly because of technology.

In 2019, Uber drivers went on strike in the UK, US, Brazil and Australia to demand better pay and conditions. Other protests against gentrification have emerged, as tech companies like Google expand into neighbourhoods in San Francisco or in Berlin. Many people have opposed the recent job loss and quarantine measures due to the COVID-19 pandemic. One more concrete example of this is how in April 2020, Amazon warehouse workers across the US refused to show up for work by calling in sick, marking the largest nationwide protest effort so far against the company’s coronavirus response. The one element linking all these uprisings is wage drops.

As Artificial Intelligence (AI) work becomes more advanced and the potential of replacing jobs becomes increasingly more possible, people have begun to lose their source of income and this is and will lead to increasingly dissatisfied citizens. It is imperative that a solution is found to mitigate the possibilities of uprisings and to ensure that as little damage as possible is done to people’s lifestyle, in order for workers to not unduly worry about a sudden loss of income.

The aim of this conference is to find an answer collectively to the following overlying issue: Does technology help or hinder the working conditions? Should this 5th Industrial Revolution be accompanied by a new kind of Social Contract at the international level?

## Definitions

AI: Artificial intelligence (AI) is an area of computer science that emphasizes the creation of intelligent “algorithms”.

Big Data: extremely large data sets that are analysed computationally to reveal patterns, trends, and associations, especially relating to human behaviour and interactions.

Biometric recognition software: Software used to identify a person based on their biometrics (fingerprint, face, voice...)

GAFAM: The acronym for Google, Apple, Facebook, Amazon and Microsoft. The five big American firms that dominate the digital market.

Globalisation: Globalisation implies increasing dependency, more trade and closer links in production and consumption between states, with the specialisation of tasks.

ICT: Information and Communications Technology

Industrial Revolution: In modern history, it is the process of change from an agrarian and handicraft economy to one dominated by industry and machine.

International division of labour: International division of labour refers to a spatial division of labour due to businesses no longer being restricted to their own countries. For example, certain places are more suited towards certain practices and certain materials can only be found in specific areas.

Labour laws: Labour laws are laws regarding what a worker or an employer can or can't do. They stipulate things like minimum age, a minimum salary etc. (they are highly defended in European countries such as France and Germany)

Labour Strike: A labour strike is a work stoppage, caused by the mass refusal of employees to work. They occur when workers feel that their wages or the health and safety at their work are inadequate.

LEDC: (Less Economically Developed Country) countries with a lower GDP and a lower standard of living than an MEDC.

MEDC: (More Economically Developed Country) a sovereign state that has a developed economy and advanced technological infrastructure relative to other less industrialised nations.

Newly Industrialised Countries: A newly industrialised country (NIC) is a term used by political scientists and economists to describe a country whose level of economic development ranks it somewhere between developing and highly developed classifications. These countries have moved away from an agriculture-based economy and into a more industrialised, urban economy.

OECD: Organisation for Economic Co-operation and Development

Outsourcing: obtaining (goods or a service) by contract from a foreign supplier.

Offshoring: basing some of a company's processes or services overseas, generally in order to take advantage of lower costs and evade taxes.

Service economy: An economy which is dominated by the provision or importance of services (as opposed to products)

Structural unemployment: A form of involuntary unemployment caused by a mismatch between the skills that workers in the economy can offer, and the skills demanded of workers by employers. It is often due to technological changes that make the job skills of many workers obsolete.

**TAI:** The technology achievement index (TAI) of the United Nations aims to capture how well a country is creating and diffusing technology and building a human skill base—reflecting capacity to participate in the technological innovations of the network age. This composite index measures achievements, not potential, effort or inputs.

**Technological unemployment:** The loss of jobs caused by technological change. It is a key type of structural unemployment.

**Technology:** the application of scientific knowledge for practical purposes, especially in industry.

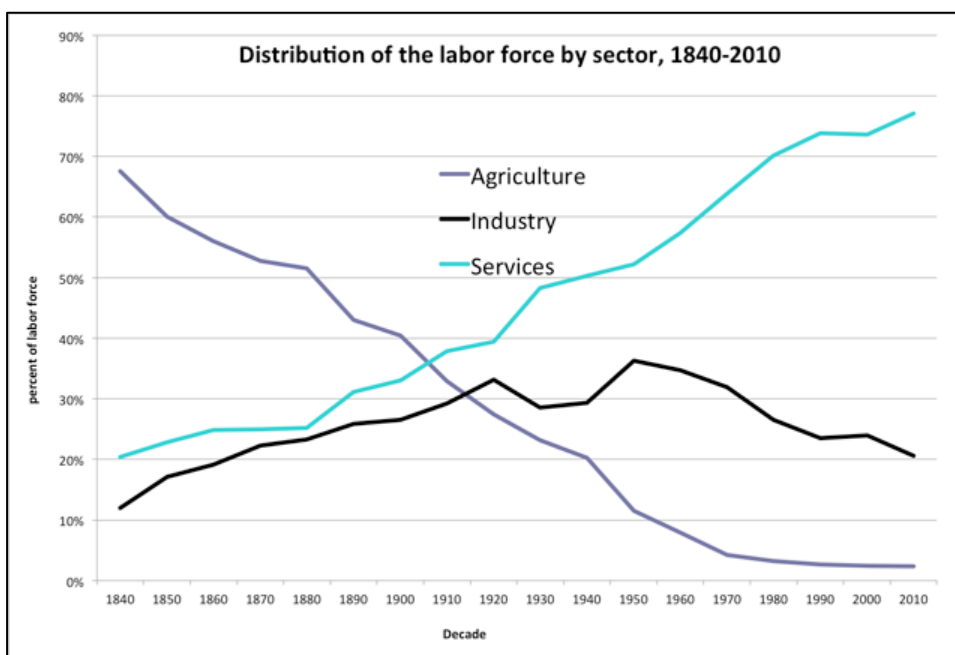
**Worker's Unions (Trade Unions):** An organization that represents the collective interests of employees. Labour unions help workers unite to negotiate with employers over wages, hours, benefits, and other working conditions

## Historical Context

We are currently in the fifth technological revolution, the age of information and telecommunications. As we will see this is not the first destructive revolution to have rocked the labour market. However, innovation in technology has advanced increasingly exponentially, and this may have massively disruptive consequences in the future.

Humanity is incredibly familiar with automation and fear of losing jobs to machines. If we look back to the industrial revolution, we discover that some artisans, craftsmen, farmers, and other occupations were replaced by large factories and machines which largely contributed to ushering in the 20th-century economy. The early 19-century labour movement opposed the ways in which mechanised manufacturers and their unskilled labourers undermined the original craftsmen.

Labour strikes became common during the Industrial Revolution, at a time when mass labour became essential in factories and mines. In many countries, strike actions were quickly made illegal, as factory owners had far more power than workers. Most western countries on the other hand partially legalised striking in the late 19th or early 20th centuries and succeeded in being represented in parliament (i.e. Labour in the UK, Socialists in France).



This Graph concerns the United-States' labour market. It shows that, proportionally, while agricultural jobs have decreased since the 19<sup>th</sup> c., and the industrial jobs since the 1950s, most jobs have been created in the service sector since the end of the 19<sup>th</sup> c.

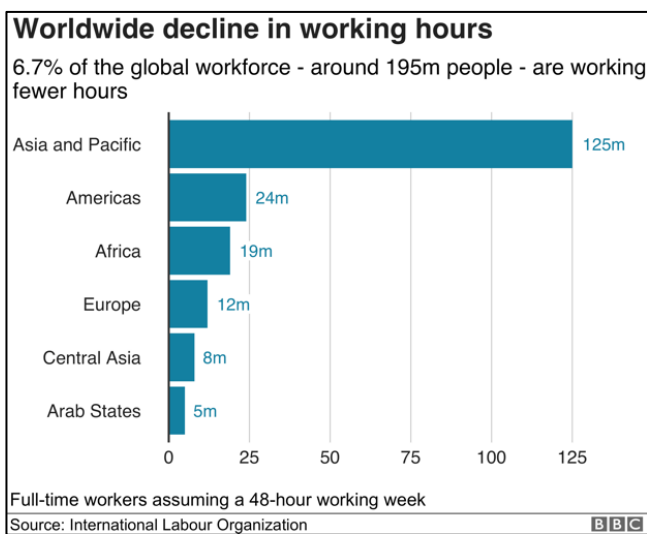
(Data from the Bureau of Economic Analysis-US Department of Commerce)

## I. Current Situation

### A. Impact of COVID-19 on workers

COVID-19 is an infectious disease that has led to the deaths of more than 500 thousand people worldwide (July 2020), which has forced most governments to close their economies.

According to ILO statistics, in April, 81% of the world's workforce was impacted by the outbreak of the COVID-19 pandemic. The virus has posed an unprecedented, challenge to economies and societies. The global economy faces its biggest danger since the 2008 Great Recession, which illustrated the instabilities of the economic and financial system. The COVID-19 crisis has exposed a problem in our economy: the dilemma which is that many people are not prepared to be working virtually. High use of ICT is also associated with higher levels of work autonomy, regardless of the place of work.



There are sectors, companies and workers which could however benefit from this pandemic. Such services are offered by a variety of companies ranging for small firms to large TNCs (transnational corporations) such as the GAFAMs, for example, online companies like Amazon, Zoom (a video conferencing website) or any online grocery delivery services, cloud computing, video conferencing, electronic payments, online gaming, telecommunication industry. Unfortunately, in other sectors (i.e. retail, travel), individuals are losing their jobs and have extreme difficulties finding new ones.

The ILO estimates indicate that the Americas (12.4%) and Europe and Central Asia (11.8%) will experience the greatest loss in working hours.

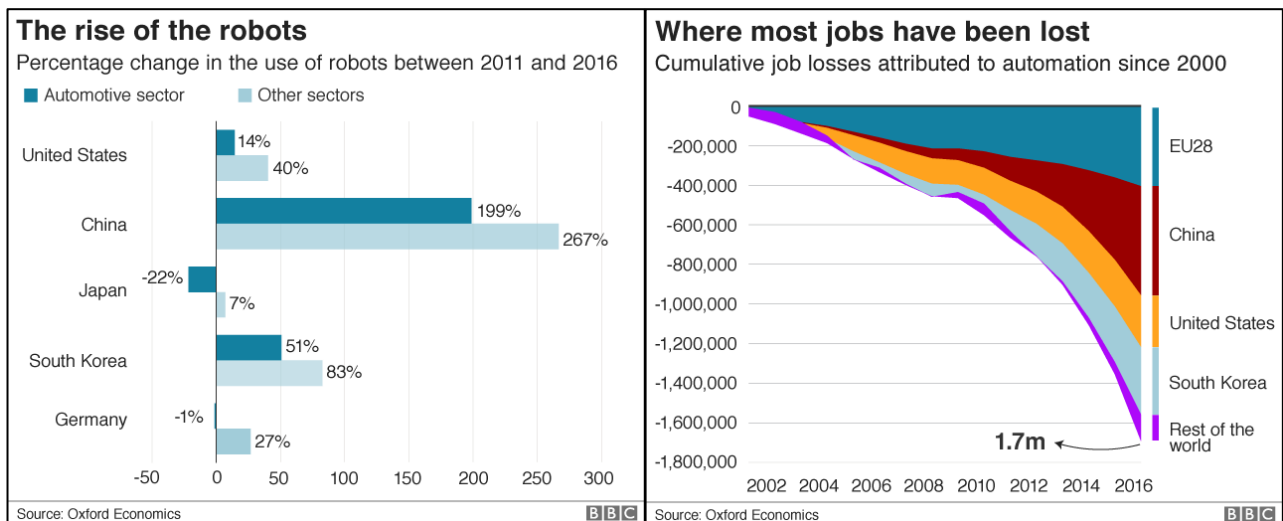
The need to find fast and effective solutions to deal with the economic and social impact on workers and companies (mainly because of the containment measures installed) is critical. Paid sick leave and unemployment compensation are pivotal tools for addressing the economic impact of the COVID-19 crisis for some workers and their families. Ensuring that sick workers can afford to stay home is essential in order to combat this virus. In order to help enable this, European Union leaders have reached an historical deal on pandemic recovery with a 750 billion € recovery fund in order to help sectors and regions particularly hit by this crisis. Furthermore, the COVID-19 crisis has highlighted the importance of essential workers, who should be recognised more, and therefore receive better pay and social protection coverage.

### B. How is technology and automation affecting work?

Technology is constantly evolving and improving, however, the implication of automation in the workforce can have devastating effects on both long-term and short-term unemployment for low skilled workers. This can particularly be seen in the automobile industry and secretarial jobs. The advancement of Robotics has led companies to implement them into their workflow.

Technology is more efficient, therefore, time and money can be used more productively if technology replaces repetitive low-skilled tasks, therefore, some factories (i.e. automobile, tech industries, meat production) have begun to replace their human workers with robots, leading to a decline in jobs in certain areas but an increase in jobs in other sectors. One example to illustrate this could be the increase in the number of mechanics in order to uphold these new machines.

Generally, within the field of factory workers, there has been a decrease in low skilled personnel, however, engineers, technicians and maintenance have new job opportunities.



A group of researchers from Oxford University has estimated that 47% of jobs in the United States could be automated within the next twenty years. The list of susceptible jobs included office and administrative support employees, transportation and logistics occupation, and labour in production occupations. However, these results, although consistent with other studies, don't necessarily guarantee that these jobs will be computerised.

We can thus observe that automation improves productivity in some sectors and can help to grow the economy as a whole. The Industrial Revolution saw the introduction of new labor saving devices and technology which did result in many jobs becoming obsolete. However, this led to new, safer, and better jobs being created and also resulted in the economy growing and living standards increasing.

### C. Facing the Technological Gap between MEDC and LEDC

Technological progress has increased by 40% to 60% faster in developing countries than in rich countries. NIC's have used technologies from abroad to grow their industrial base before creating their own scientific and technological breakthroughs. India, one of the largest and fastest-growing markets for digital consumers, is an example of this.

The UN Technology Bank helps less developed countries build the science, technology and innovation capacity that they need to promote the structural transformation of their economies, eradicate poverty and foster sustainable development. The organisation supports the delivery of online training activities for the 47 least developed countries to enhance access to recent scientific knowledge. For example, The UN Technology Bank works to strengthen the capacity of Academies of Science in least developed countries so that these institutions can act as advisors to the government and industry on science, technology and innovation.



Disparities among countries in their capacity to create and use technology for development have persisted for a long time and are now huge. It is likely to become an increasingly significant factor in determining patterns of global development and poverty in the 21st century. The last decade's technological transformations and the emergence of the global marketplace have raised the stakes for all countries to be technologically connected – to be able to create, adapt and use global technological innovations. These gaps in technological advance can further widen developmental divides in the 21<sup>st</sup> century of rapid technological transformations that are driving the historic shift from the industrial to the network age in which the rewards and penalties of global technological advances are increasing. The breakthroughs in biotechnology and ICT are extending the frontiers of advances in medicine, food production, communications, and many other activities that make possible huge gains in human development. The technology sector is also the fastest growing sector of the global economy.

## II. Advantages of technology for workers

### A. Technology can also create jobs

Although new technology and automation can cause direct job loss, they also result in the creation of new jobs, mainly in the tech supply and maintenance industry. It also creates new opportunities in new industries, such as engineers, data experts, analysts and cybersecurity experts. Research from a 2011 McKinsey study shows that in the past 15 years the internet has destroyed 500,000 jobs in France but has simultaneously created 1.2 million others. This means that 2.4 jobs were created for every job destroyed. The growing role of big data in the economy and business will create a significant demand for statisticians and data analysts. Automation does displace workers but doesn't affect the total amount of jobs in the economy.

The following is a relevant example: In many cases, automation leads to *worker displacement* - decreased employment as many workers are replaced by a few machines. Other times the increased productivity may actually create more jobs in the sector that is being automated, via a process called *worker augmentation*. For example, the rapid adoption of Automated Teller Machines (ATMs) from the 1980s to the 2000s counterintuitively increased the number of bank teller jobs throughout that period. While

the bank tellers per bank office decreased, ATMs lowered the cost of opening new bank offices in general, so the number of bank offices increased. This led to banks hiring more bank-related workers and therefore also more bank tellers. But something did change: the job description of the bank tellers, who began to focus more on handling customer relations as their more routine tasks were being automated.



## Example of tools providing new job opportunities: Digital talent platforms

With their powerful search capabilities and sophisticated screening algorithms, online talent platforms (i.e. LinkedIn) provide several beneficial opportunities in the work industry. For instance, they speed up the hiring process and decrease the time individuals spend searching between jobs, therefore reducing unemployment. By showcasing work opportunities with flexible options, they can increase labour participation and working hours. Online talent platforms help put the right people in the right jobs, thereby increasing their productivity and job satisfaction.

Technology can be used to help better communication and collaboration as a team online. The same technology has changed both where job-seekers look for work and where hiring managers find talented employees.

One of the most prevalent hiring issues that leads to unemployment however is locational mismatching. Where there is a demand for work, there may not be available and qualified workers to be found (For example, skilled health care workers in Sweden and Agricultural harvester farmers in the UK). This geographic mismatch can be seen across regions within countries, and between countries. Typically, digital talent platforms help reducing this gap and ease a number of labor-market dysfunctions by more effectively connecting individuals with work opportunities.

### **B. “Creative destruction”**

Political Economist Joseph Schumpeter called the process of technology disrupting industries and destroying jobs, but ultimately creating new, better ones and growing the economy by the term “creative destruction”.

Throughout history, technological progress has vastly shifted the composition of employment from agriculture and the artisan shop, to manufacturing and clerking, to service and management occupations.

Yet the concern over technological unemployment has proven to be exaggerated. As economists have long understood, however, an invention that replaces workers by machines will have effects on all product and factor markets. An increase in the efficiency of production which reduces the price of one good, will increase real income and thus increase demand for other goods.

For example, research conducted by Deloitte revealed that between 2001 and 2015, technology had displaced over 800,000 jobs in the UK alone, but it had created approximately 3.5 million new ones. Claims that new technology will lead to mass unemployment have been present throughout history, but thus far the opposite has happened. As such, we should treat any similar claims about the impact of AI with caution.

In summary, for many cases in the past, we can observe the following:

1. Technology-enabled automation displaces some workers and augments others.
2. Displaced workers transition to new jobs, some of which are created by automation. The government helps to facilitate this transition via investments in training and education.
3. Increased productivity raises incomes, lowers work hours (average work time in the U.S. has fallen more than 50% since the early 1900s), and lowers prices, creating more demand for goods and services, leading to more jobs and broader economic growth.

### C. Digitally enabled Independent work

Digital technology can also enable new forms of entrepreneurial activity. This further allows workers in small businesses and self-employed occupations to benefit from higher income-earning opportunities. In India for example, Google, Tata and Intel released the internet Saathi (friends of the internet) program in which rural women are trained to use the internet, and then become local agents who provide services in their villages through internet-enabled devices, such as distributing phones and SIM cards, or becoming financial-services agents who help local people access government schemes and benefits through an internet-based device, etc...

The use of digitally-enabled independent work has generally increased in recent years due to the scale, efficiency and practicality of certain platforms, such as Uber, Etsy, Didi, etc... However, as self-employment has increased, such non-standard workers are 50% less likely to be unionised than standard employees. In some countries, they are also 40-50% less likely to get income support when out of work.

## III. What are the challenges brought by automation and technology?

### A. Economic inequality and discrimination in the workplace

The transition into a digital world often benefits people with higher education or people with access to higher education. The wealth created by new advancements in technology hasn't benefitted the income of the workers in the average household but is increasing the income of the people at the top of the income distribution. Highly skilled workers working with technology will thus more largely benefit from it.

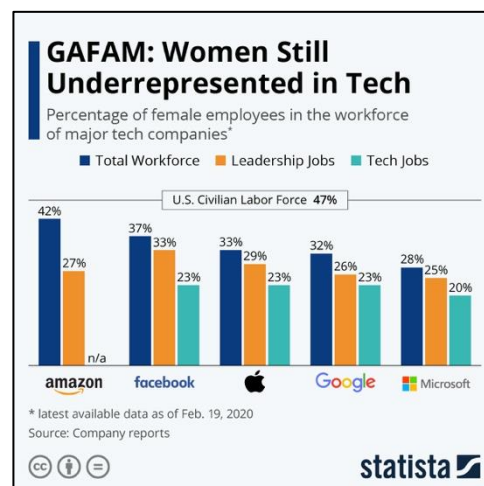
Whilst low-skilled workers working with technology will be able to achieve more in terms of output and productivity, these workers may experience wage pressure, given the potentially larger supply of similarly low-skilled workers, unless demand for the occupation grows more than the expansion in labour supply.

Furthermore, the installing, maintaining and repairing of artificial intelligence is expensive, so this may not be an option for less affluent businesses.

Artificial Intelligence also has the potential to mitigate the corporate gender, sexuality and racial leadership gaps by removing bias in recruiting, evaluation, and promotion decisions.

However, according to Forbes, biased data is a source of risk. If not carefully designed, AI applications can perpetuate and exacerbate gender and racial bias, further widening the gap in the leadership pipeline.

AI systems are programmed to make decisions based on training data, which can include biased human decisions or reflect historical or social inequities. Therefore, if an AI application is programmed on data that is biased, the algorithms it develops will likely be biased, too. For example, Amazon found that an algorithm it had developed as a hiring tool was penalising women because the data which it was based had been pulled from ten years of (mostly male) resumes.





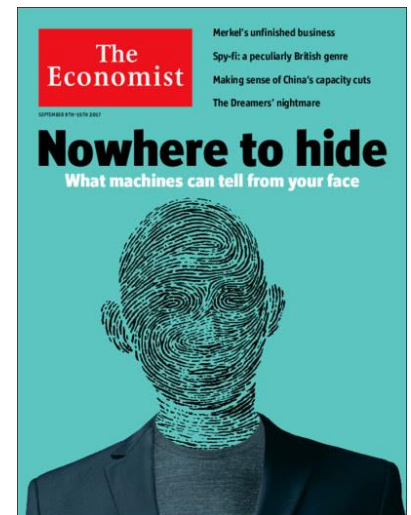
## B. Workplace surveillance, Facial recognition and Privacy

The possibility of using biometric data to evaluate employees in the workplace gained a lot of backlash in regard to user privacy.

For instance, Amazon has been using AI systems to track warehouse workers' productivity and automatically generate paperwork to fire those that failed to meet expectations. Sanitation workers in Nanjing, China receive messages like "please continue working" from their local tracking bracelets when they decided to stay in one place. As activists take to the streets to protest racial injustice in the Black Lives Matter Movement, some fear how the smartphones they use to document these events are being monitored by law enforcement.

In the absence of regulation around location data privacy and facial recognition, some of the largest tech companies supplying these tools, including Amazon, Microsoft and IBM have taken a stand against their use in protests or law enforcement. The use of Electronic logging devices (ELD) to measure and limit driving hours has been protested by truck drivers in the US for being intrusive and controlling.

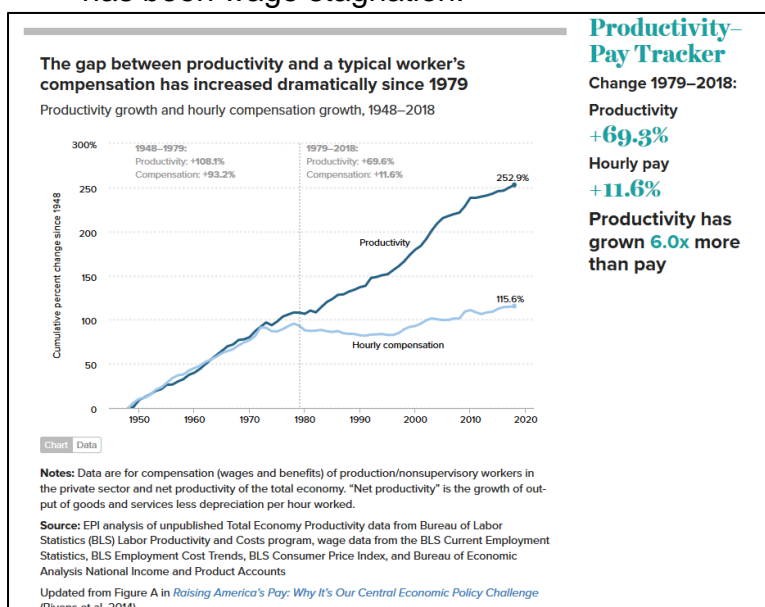
These cases of AI interfering with social customs may have negative impacts on creating a human-AI symbiotic society.



## C. Productivity, Pay and Skills Gap

In the United States, from 1979 to 2018, net productivity rose by 108.1%, while the hourly pay of typical workers essentially stagnated — increasing by only 11.6% over 39 years (after adjusting for inflation). This means that although Americans are working more productively than ever, the fruits of their labours have primarily accrued to those at the top and to corporate profits, especially in recent years.

Rising productivity provides the potential for substantial growth in pay for the vast majority of workers. However, this potential has been squandered in recent decades. The income, wages, and wealth generated over the last four decades have failed to "trickle down" to the vast majority largely because policy choices made on behalf of those with the most income, wealth, and power have exacerbated inequality. Rising inequality has prevented *potential* pay growth from translating into *actual* pay growth for most workers. The result has been wage stagnation.



In order for future productivity gains to lead to robust wage growth and widely shared prosperity, some advocate for the need to institute policies that reconnect pay and productivity and restore worker power, such as those in EPI's First Day Fairness Agenda (see below) and the Agenda to Raise America's Pay (see below). Without such policies, efforts to spur economic growth or increase productivity (the largest factor driving growth) will fail to lift most "typical" workers' wages.

### What is 'First Day Fairness'?

First Day Fairness is the right of all workers to a fair system of work from their first day on the job. U.S. workers are essential contributors to economic growth in the U.S. and they deserve a fair share of that growth and a fair say in their working conditions. First Day Fairness requires a rebalancing of our current system to ensure that workers' interests and concerns are served. It means that from the first day on the job working people can have a union in order to collectively bargain for better wages and working conditions. It means that workers know from the start how much they will be paid and when they will be paid; they know who their legal employer is; they are in a safe workplace; they have a predictable schedule and access to paid sick time; they can go to court if they are discriminated against; and they are not afraid of retaliation if they report issues at work. It also means that they have confidence that the government will enforce their workplace protections.

### What is the Agenda to Raise America's Pay?

The Economic Policy Institute launched Raising America's Pay, a multiyear research and public education initiative to make wage growth an urgent national policy priority. By explaining wage and benefit patterns—and the role of labor market policies and practices in suppressing pay—the initiative is identifying policies that will generate broad-based wage growth. This work is connecting with and supporting civic engagement and community organizing groups working on pay and job quality issues to support their campaigns.

The federal minimum wage, adjusted for inflation, has fallen by a third over the past half century, even as worker productivity has risen 150%.

### Examples of strategies developed to close the skills gap:

#### - Switzerland – Nurturing Innovation

For the past seven years, Switzerland has ranked at the top in the Cornell, INSEAD and World Intellectual Property Organization (WIPO)'s annual report of the most-innovative countries. The tiny Alpine nation also consistently leads the world in patent applications per capita and offers a fertile environment for seed funding, thanks to government incentives to encourage bank lending to entrepreneurs.

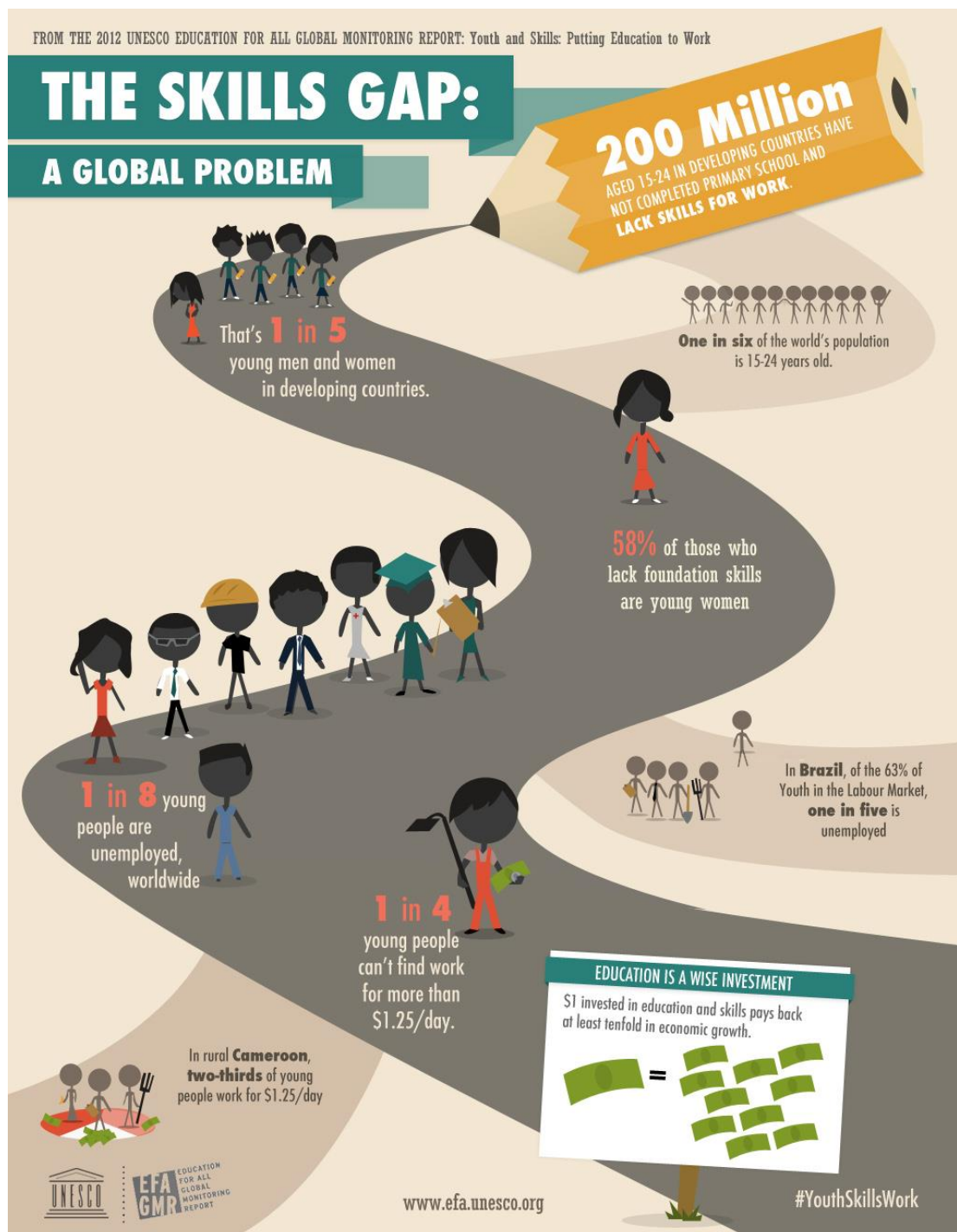
This focus towards innovative thinking is driven by universities such as Lausanne's EPFL, which ranks fourth in the world for innovation and is home to startups, as well as global corporations such as Nestlé and Siemens. The collaborative approach between institutions, the government, businesses and individuals helps to provide every step on the path to fostering innovative talent.

Shastri points to a recent Aon report that highlights how high-growth companies leverage talent, as well as how collaboration among teams is critical to fostering innovation. Shastri adds that for a company to drive innovation and go beyond its own boundaries, it needs a "collective genius" – a blend of skillsets across individuals and teams.

- Singapore – Emphasizing Education

A major contributing factor to the skills gap is ineffective education systems. College graduates around the world are no longer guaranteed employment – a situation which is true in both developed and developing economies. This comes in part from a skills mismatch, with 40 percent of European companies reporting difficulties in hiring adequately, as graduates leave higher education without the skills or experience businesses today require of new hires.

An OECD report into workplace skills found that Singapore led the world in literacy, numeracy and problem solving. The ranking highlighted the sustained efforts of the city states' education system to bring its population up to speed with the skills needed in the modern workplace. However, this education drive is not evenly spread across the population, with the report finding Singapore's older workers are falling behind – highlighting the need to consider the entire working population when addressing the skills gap.



## **Role of the International Labour Organisation (ILO)**

Creation of labour law: a response to the need to protect the workers' conditions and rights.

As part of its mission, the ILO aims to achieve decent work for all by promoting social dialogue, social protection and employment creation, as well as respect for international labour standards. 186 of the 193 member states of the United Nations are members of the ILO.

The ILO was created in 1919 as part of the Treaty of Versailles to reflect the belief that universal and lasting peace can be accomplished only if it is based on social justice.

The process resulted in a tripartite organisation, the only one of its kind, bringing together representatives of governments, employers and workers in its executive bodies.

The driving forces for the ILO's creation arose from security, humanitarian, political and economic considerations. The founders of the ILO recognised the importance of social justice in securing peace, against a background of exploitation of workers in industrialising nations at that time. There was also an increasing understanding of the world's economic interdependence, and the need for cooperation in order to obtain equality of working conditions in countries competing for markets.

Reflecting these ideas, the Preamble of the ILO Constitution states:

“Whereas universal and lasting peace can be established only if it is based upon social justice;

And whereas conditions of labour exist involving such injustice, hardship and privation to large numbers of people as to produce unrest so great that the peace and harmony of the world are imperilled; and improvement of those conditions is urgently required;

Whereas also the failure of any nation to adopt humane conditions of labour is an obstacle in the way of other nations which desire to improve the conditions in their own countries.”

## **Potential solutions**

There is an increasing demand for ICT skills, however, OECD data reveals that between 7% and 27% of adults have no experience in using computers or lack the most elementary computer skills, such as the ability to use a mouse. Therefore, adult training should better target the disadvantaged, such as more “low-skilled” individuals.

If automation does result in a significant reduction in employment or greater pressure on wages, some ideas such as universal basic income and better social protection coverage, such as medical insurance for workers in non-standard jobs could help to mitigate this. Other mitigating factors could be as follow:

- Conditional transfers and adapted social safety nets could be considered and tested.
- The need for net neutrality, in order to prevent big companies from paying for higher speed internet. Net neutrality helps to provide freedom of information exchange, promotes competition and innovation for Internet services, and upholds standardization of Internet data transmission which was essential for its growth.
- The need for more transparency about how biometric technology is used to surveil employees.

- Funding for developing countries to develop digitally. Accessible and affordable internet connection should be considered as a human right; however, 3 billion people have no access to the internet.

All of these questions lead to the following dilemma: How can the United Nations help build up to the new challenges of our time and may set up a new Social Contract, as developed by economist Carlotta Perez in *Technological Revolutions and Financial Capital: The Dynamics of Bubbles and Golden Ages*?

## **Countries / Organisations / Companies / Sectors**

### **1. Case study on exoskeletons**

Exoskeleton Market size valued at over USD 220 million in 2018, industrial, military and healthcare sectors, and is expected to witness around 41% CAGR (compound annual growth rate) from 2019 to 2026.

The rise of aging population across the globe is also expected to propel industry growth. According to the World Health Organization, the world's population above 60 years will rise from 12% in 2015 to around 22% in 2050. Muscle strength and physical labour capabilities deteriorate with increasing age. Growing adoption of medical devices to support and actuate body movement are thus forecasted to propel market growth throughout the forecasted period.

Exo-suits aid in lifting and reducing the stress on user's body parts such as back muscles and spine. Manufacturing facilities are adopting tool handling exoskeletons, powered gloves, and body-powered suits to decrease fatigue while working for an extended time period. Proliferating demand for wearable suits in manufacturing & construction sectors to improve productivity and reduce injuries & fatigue will escalate the exoskeleton industry size.

Ongoing technological innovations to reduce the overall weight and ease motion will drive exoskeleton market revenue. Industry participants are working with research agencies such as the Wyss Institute and Harvard Biodesign Laboratory to develop advanced suits with multiple gait patterns. In May 2016, the Wyss Institute and ReWalk Robotics collaborated to develop lightweight soft exo-suits for assisting people with lower limb disabilities.

Industry participants are continuously investing in R&D to develop exoskeletons that are light-weight and offer improved mobility. For instance, SRI International are developing a low cost SuperFlex exo-suit for usage across multiple industries including healthcare and military, manufactured with 4D materials. Proliferation of advanced technological sensors and integration of big data and AI technologies will provide potential growth prospects for the market till 2026.

Report Coverage	Details		
Base Year:	2018	Market Size in 2018:	220 Million (USD)
Historical Data for:	2014 to 2018	Forecast Period:	2019 to 2026
Forecast Period 2019 to 2026 CAGR:	41.5%	2026 Value Projection:	3.5 Billion (USD)
Pages:	350	Tables, Charts & Figures:	421
Geographies covered (14):	U.S., Canada, Germany, France, UK, Russia, Japan, China, Australia, Singapore, South Korea, Brazil, Mexico, MEA		
Segments covered:	Product, Application and Region		
Companies covered (21):	Knots Plus Ltd., ATOUN Inc, BIONIK, CYBERDYNE, INC., Ekso Bionics, GOGOA, Hocoma, Honda Motor Co. Ltd, Hyundai Motor Company, Laevo exoskeleton, Lockheed Martin Corporation, Noonee, Parker Hannifin, Revision Military, ReWalk Robotics, Rex Bionics Ltd., Sarcos Corp., SRI International, Technaid S.L., US Bionics, Wandercraft		
Growth Drivers:	<ul style="list-style-type: none"> <li>• Growth drivers</li> <li>• North America</li> <li>• High incidence of Parkinson's and other muscle-related diseases</li> <li>• Europe</li> <li>• Ageing population growth and national security requirements</li> <li>• Asia Pacific</li> <li>• Proliferating demand in manufacturing &amp; healthcare</li> <li>• Latin America</li> <li>• Strong emphasis on boosting industrial sector and rising elderly population</li> <li>• MEA</li> <li>• Proliferating construction industry and requirement to improve labor safety</li> </ul>		

## **2. Case study on the Coronavirus and workers**

Since the first ILO Monitor, the COVID-19 pandemic has further accelerated in terms of intensity and expanded its global reach. Full or partial lockdown measures are now affecting almost 2.7 billion workers, representing around 81% of the world's workforce.

The vast majority of job losses and declining working hours will occur in hardest-hit sectors. The ILO estimates that 1.25 billion workers, representing almost 38 per cent of the global workforce, are employed in sectors that are now facing a severe decline in output and a high risk of workforce displacement. Key sectors include retail trade, accommodation and food services, and manufacturing. In low- and middle-income countries particularly, hard-hit sectors have a high proportion of workers in informal employment and workers with limited access to health services and social protection. Without appropriate policy measures, workers face a high risk of falling into poverty and will experience greater challenges in regaining their livelihoods during the recovery period.

In addition to potential job losses, working conditions are worsening, with an increased monitoring of workers.

Amazon is piloting a system that sends real-time warnings to workers if they're standing too close to each other. Some major companies are testing technology to identify workers who have been in close contact with a coworker who tests positive for the coronavirus.

Employers are rushing to use digital tracking technology to reduce virus transmission in the workplace. But privacy experts worry that businesses will start using their newfound surveillance capabilities for purposes far beyond public health. This data could be used



to evaluate workers' productivity, see which colleagues are holding meetings or even flag an employee who unexpectedly ducks out of the office during work hours.

"The risk is that these tracking technologies become an avenue for more extensive data collection that's really unconnected with the public health emergency and they will continue on after the public health emergency is over," said Pauline Kim, an employment law expert at Washington University in St. Louis.

The market for privately developed apps is being fueled partly by state and local governments' struggles to ramp up similar digital tools aimed at identifying potential trouble spots for the virus. Those government-sponsored apps have typically been slow to roll out and have had little buy-in from a public that's skeptical of having their movements tracked digitally.

"Routine tracking of people's movements [even] on premises is not something we've historically ever needed, outside of these circumstances."

Unlike local health authorities, employers have wide latitude to mandate workers use apps or wear tracking devices. Depending on state laws, employers may not even be required to disclose monitoring programs installed on workplace hardware — and may even be able to fire workers who reject the technology. Kim said previous court decisions have left it less clear whether employers can track their workers after hours, so that legal ambiguity might encourage employers to experiment with around-the-clock surveillance while the virus remains a threat.

Privacy advocates warn the tracing apps are a slippery slope toward “normalizing” an unprecedented new level of employer surveillance, even if the devices are only used at the office and don't follow people in their off-hours.

"Routine tracking of people's movements [even] on premises is not something we've historically ever needed, outside of these circumstances," said Alan Butler, interim head of the influential Electronic Privacy Information Center.

Employers are still figuring out the way forward with little help or instructions from the federal government. On Wednesday, Virginia moved to install the country's first state-wide coronavirus workplace safety rules, which among other things could mandate physical distancing and require companies to quickly inform workers they were possibly exposed to the virus. If other states follow suit, this could fuel an emerging market for employer-based-tracing apps, which could be worth billions of dollars by some projections.

Public health experts meanwhile worry these workplace apps could further silo data about the virus' spread. If employers aren't sharing information with local health authorities or neighboring businesses, they might miss a chance to stamp out the next hot spot. A state-by-state approach to contact tracing — as opposed to one national system — already leaves gaps in efforts to trace and isolate people who have been exposed to the virus.

"Contact tracing in your office doesn't do you any good when Johnny goes home and exposes the rest of the family," said Georges Benjamin, who heads the American Public Health Association.

Privacy advocates warn that tracing apps are a slippery slope toward “normalizing” an unprecedented new level of employer surveillance.

The Trump administration has given little guidance on how to deploy tracing apps, but it has said businesses could take other sweeping steps to keep their workplaces free from the virus — like requiring temperature checks and diagnostic tests, as long as those measures are applied equally and don't target certain employees. The CDC's vague guidelines for digital contact tracing suggests that apps should, at a minimum, let users

know how their data is being used and stored. But the CDC hasn't specified whether public health agencies or businesses should be taking the lead on developing these apps — or share their data with each other.

"Any guidance [from the government] would be helpful so we can all be marching in the same direction," said Robert Costantini, CEO of Triax, which sells devices helping factory floors and other workplaces monitor workers' movements in hazardous or restricted areas. The company recently re-purposed this technology in order for customers to enforce social distancing.

Companies selling these workplace apps have emphasized that they're not collecting troves of location-specific data that show where employees are going throughout the day. The PwC app, which the professional services company has been testing internally for the past six weeks, uses a smartphone's Bluetooth signal to track workers' movements without capturing real-time geolocation information. This is similar to the "proximity technology tracking" Apple and Google are providing to local governments to build their own apps.

When a worker reports they've tested positive or had possible exposure to the coronavirus, an employer — typically someone in human resources — can access app data to identify who was recently in contact with that employee and get them to isolate.

PwC, which plans to roll out its app more broadly in the next two weeks, is requiring employees to download the technology as a condition to returning to office, though it will allow most to continue working from home. The company, which has fielded interest from small startups to global corporations, isn't telling clients whether they should require workers to use the app.

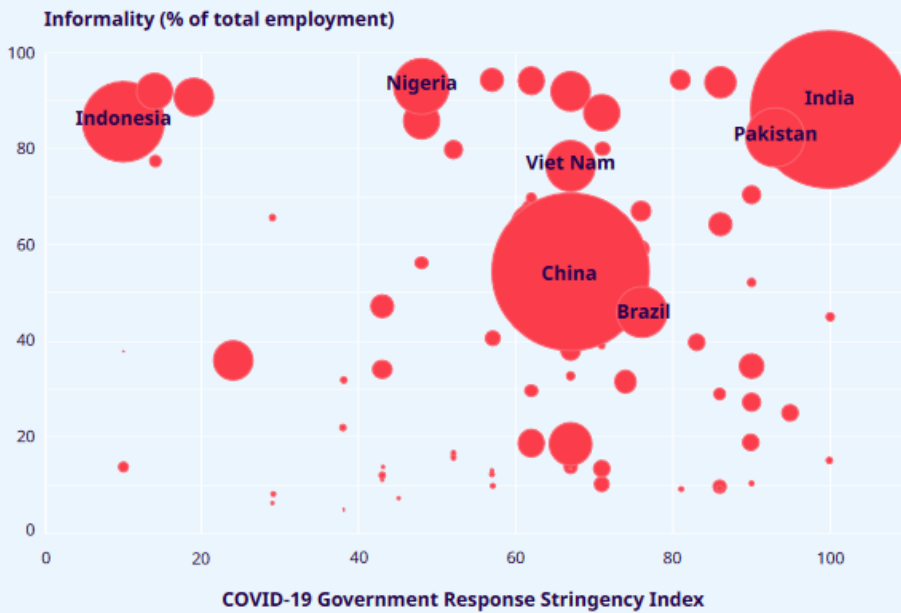
"We've had some clients who have talked about mandating this for their workforce... [but] if you mandate it and I don't want to use it, I'm just going to leave my phone at my desk," said David Sapin, who leads the PwC team building the tracker.

At Ford, about 1,000 employees across four facilities have been testing wristbands which keep track of contacts and buzz if employees get too close, according to a company spokesperson. The pilot program, which isn't mandatory, has been limited to employees enlisted to help ramp up production of medical devices and personal protective equipment since the coronavirus hit, the spokesperson said.

There are however some drawbacks to relying on workplace tracing apps. These apps may for instance not have reliable data if an employee doesn't have their phone on them all day. They also depend on workers to self-report, and some employees may be reluctant to divulge they may have been exposed to coronavirus if that means being forced into quarantine.

ILO projections suggest that the labour market recovery during the second half of 2020 will be uncertain and incomplete. In the baseline scenario, working-hour losses are likely to still be in the order of 4.9 per cent (equivalent to 140 million full-time jobs) in the fourth quarter of the year. However, under the pessimistic scenario, which assumes a second wave of the pandemic in the second half of 2020, working-hour losses would be as high as 11.9 per cent (equivalent to 340 million full-time jobs) in the last quarter. Even in the optimistic scenario, which assumes a fast recovery, global working hours are unlikely to return to the pre-crisis level by the end of 2020. In addition to this data, women and vulnerable people are impacted in a disproportionate way.

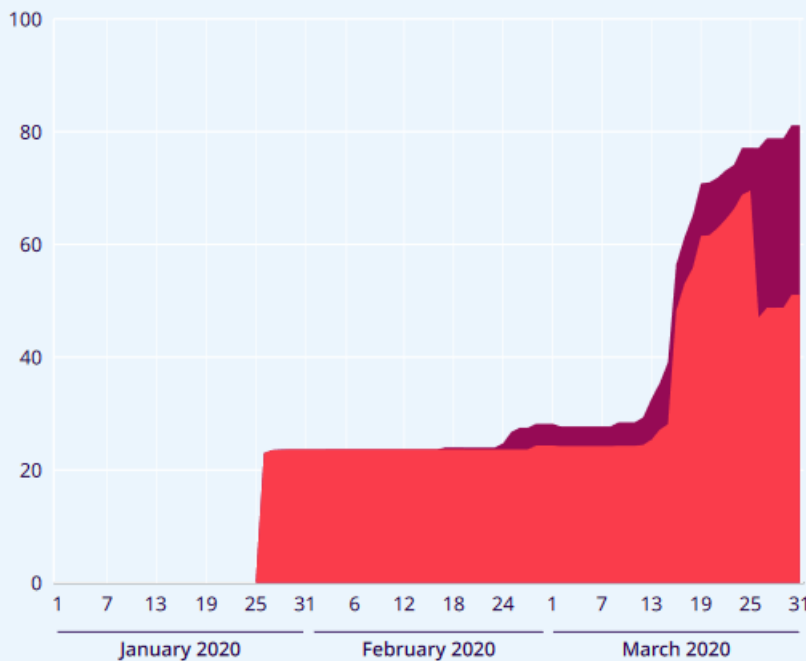
### Informal workers under lockdown and other containment measures



**Note:** The horizontal, x-axis of this chart displays University of Oxford's COVID-19 Government Response Stringency Index. The vertical, y-axis shows informal employment as a share of total employment in the respective country, based on internal ILO calculations. As a third dimension, the respective size of each bubble shows the relative size of total informal employment in each country, which is calculated by multiplying the percentage of informal employment (i.e. the value shown on the y-axis) by total employment as per ILOSTAT's modelled estimates for 2020. See Technical annexes 1 and 3 for further details.

### Employment in countries with workplace closures

#### Global workforce (%)



- Share of world's employed living in countries with **recommended workplace closures**
- Share of world's employed living in countries with **required workplace closures**

**Note:** The share of employed in countries with recommended workplace closures is stacked with those in countries with required closures. See Technical Annex 1 for more information.

**Source:** ILOSTAT, ILO modelled estimates, November 2019 and The Oxford COVID-19 Government Response Tracker

Working-hour losses, world and by income group, first and second quarters of 2020 (percentage)



Source: ILO nowcasting model (see Technical Annex 1).

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