WORLD ECONOMIC FORUM

# The Future of Jobs Report 2020

OCTOBER 2020

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# Preface

**Klaus Schwab**
**Founder and**
**Executive Chairman**

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After years of growing income inequality, concerns about technology-driven displacement of jobs, and rising societal discord globally, the combined health and economic shocks of 2020 have put economies into freefall, disrupted labour markets and fully revealed the inadequacies of our social contracts. Millions of individuals globally have lost their livelihoods and millions more are at risk from the global recession, structural change to the economy and further automation. Additionally, the pandemic and the subsequent recession have impacted most those communities which were already at a disadvantage.

We find ourselves at a defining moment: the decisions and choices we make today will determine the course of entire generations' lives and livelihoods. We have the tools at our disposal. The bounty of technological innovation which defines our current era can be leveraged to unleash human potential. We have the means to reskill and upskill individuals in unprecedented numbers, to deploy precision safety nets which protect displaced workers from destitution, and to create bespoke maps which orient displaced workers towards the jobs of tomorrow where they will be able to thrive.

However, the efforts to support those affected by the current crisis lag behind the speed of disruption. It is now urgent to enact a Global Reset towards a socio-economic system that is more fair, sustainable and equitable, one where social mobility is reinvigorated, social cohesion restored, and economic prosperity is compatible with a healthy planet. If this opportunity is missed, we will face lost generations of adults and youth who will be raised into growing inequality, discord and lost potential.

The *Future of Jobs Report* provides the timely insights needed to orient labour markets and workers towards opportunity today and in the future of work. Now in its third edition, the report maps the jobs and skills of the future, tracking the pace of change and direction of travel. This year we find that while technology-driven job creation is still expected to outpace job destruction over the next five years, the economic contraction is reducing the rate of growth in the jobs of tomorrow. There is a renewed urgency to take proactive measures to ease the transition of workers into more sustainable job opportunities. There is room for measured optimism in the data, but supporting workers will require global, regional and national public-private collaboration at an unprecedented scale and speed.

The Platform for the New Economy and Society at the World Economic Forum works as a "docking station" for such collaboration on economic growth, revival and transformation; work, wages and job creation; education, skills and learning; and diversity, equity and inclusion. By leveraging this publication and other insights, the Platform supports a range of consortia and action coalitions, including the Reskilling Revolution Initiative to provide better jobs, skills and education to one billion people by 2030. We are deeply grateful to the New Economy and Society Stewardship Board members for their leadership of this agenda, to the over 100 partners of the Platform, and the expert guidance of Global Future Councils, the communities of Chief Economists, Chief Human Resource Officers, Chief Learning Officers and Chief Diversity Officers, and to a range of national ministries of economy, education and labour.

We are also grateful to the many partners whose views created the unique collection of insights in this report. It presents the workforce planning and quantitative projections of Chief Human Resource and Strategy officers through to 2025, while also drawing upon the qualitative expertise of a wide range of World Economic Forum executive and expert communities. In addition,

the report features unique data from LinkedIn, Coursera, ADP and FutureFit.AI, which have provided innovative new metrics to shed light on one of the most important challenges of our time.

We would like to express our appreciation to Vesselina Ratcheva, Insights Lead; Guillaume Hingel, Insights Lead; and Sophie Brown, Project Specialist for their dedication to this report. We would also like to thank Ida Jeng Christensen, Eoin Ó Cathasaigh, Genesis Elhussein, Till Leopold and SungAh Lee for their support of this project at the World Economic Forum.

Human ingenuity is at the root of all shared prosperity. As the frontier between the work tasks performed by humans and those performed by machines and algorithms shifts, we have a short window of opportunity to ensure that these transformations lead to a new age of good work, good jobs and improved quality of life for all. In the midst of the pandemic recession, this window is closing fast. Businesses, governments and workers must plan to work together to implement a new vision for the global workforce.

# Executive Summary

The COVID-19 pandemic-induced lockdowns and related global recession of 2020 have created a highly uncertain outlook for the labour market and accelerated the arrival of the future of work. The *Future of Jobs Report 2020* aims to shed light on: 1) the pandemic-related disruptions thus far in 2020, contextualized within a longer history of economic cycles, and 2) the expected outlook for technology adoption jobs and skills in the next five years. Despite the currently high degree of uncertainty, the report uses a unique combination of qualitative and quantitative intelligence to expand the knowledge base about the future of jobs and skills. It aggregates the views of business leaders—chief executives, chief strategy officers and chief human resources officers–on the frontlines of decision-making regarding human capital with the latest data from public and private sources to create a clearer picture of both the current situation *and* the future outlook for jobs and skills. The report also provides in-depth information for 15 industry sectors and 26 advanced and emerging countries.

The report's key findings include:

- **The pace of technology adoption is expected to remain unabated and may accelerate in some areas.** The adoption of cloud computing, big data and e-commerce remain high priorities for business leaders, following a trend established in previous years. However, there has also been a significant rise in interest for encryption, non-humanoid robots and artificial intelligence.

- **Automation, in tandem with the COVID-19 recession, is creating a 'double-disruption' scenario for workers.** In addition to the current disruption from the pandemic-induced lockdowns and economic contraction, technological adoption by companies will transform tasks, jobs and skills by 2025. Forty-three percent of businesses surveyed indicate that they are set to reduce their workforce due to technology integration, 41% plan to expand their use of contractors for task-specialized work, and 34% plan to expand their workforce due to technology integration. By 2025, the time spent on current tasks at work by humans and machines will be equal. A significant share of companies also expect to make changes to locations, their value chains, and the size of their workforce due to factors beyond technology in the next five years.

- **Although the number of jobs destroyed will be surpassed by the number of 'jobs of tomorrow' created, in contrast to previous years, job creation is slowing while job destruction accelerates.** Employers expect that by 2025, increasingly redundant roles will decline from being 15.4% of the workforce to 9% (6.4% decline), and that emerging professions will grow from 7.8% to 13.5% (5.7% growth) of the total employee base of company respondents. Based on these figures, we estimate that by 2025, 85 million jobs may be displaced by a shift in the division of labour between humans and machines, while 97 million new roles may emerge that are more adapted to the new division of labour between humans, machines and algorithms.

- **Skills gaps continue to be high as in-demand skills across jobs change in the next five years.** The top skills and skill groups which employers see as rising in prominence in the lead up to 2025 include groups such as critical thinking and analysis as well as problem-solving, and skills in self-management such as active learning, resilience, stress tolerance and flexibility. On average, companies estimate that around 40% of workers will require reskilling of six months or less and 94% of business leaders report that they expect employees to pick up new skills on the job, a sharp uptake from 65% in 2018.

- **The future of work has already arrived for a large majority of the online white-collar workforce.** Eighty-four percent of employers are set to rapidly digitalize working processes, including a significant expansion of remote work—with the potential to move 44% of their workforce to operate remotely. To address concerns about productivity and well-being, about one-third of all employers expect to also take steps to create a sense of community, connection and belonging among employees through digital tools, and to tackle the well-being challenges posed by the shift to remote work.

- **In the absence of proactive efforts, inequality is likely to be exacerbated by the dual impact of technology and the pandemic recession.** Jobs held by lower wage workers, women and younger workers were more deeply impacted in the first phase of the economic contraction. Comparing the impact of the Global Financial Crisis of 2008 on individuals with lower education levels to the impact of the COVID-19 crisis, the impact today is far more significant and more likely to deepen existing inequalities.

- **Online learning and training is on the rise but looks different for those in employment**

**and those who are unemployed.** There has been a four-fold increase in the numbers of individuals seeking out opportunities for learning online through their own initiative, a five-fold increase in employer provision of online learning opportunities to their workers and a nine-fold enrolment increase for learners accessing online learning through government programmes. Those in employment are placing larger emphasis on personal development courses, which have seen 88% growth among that population. Those who are unemployed have placed greater emphasis on learning digital skills such as data analysis, computer science and information technology.

– **The window of opportunity to reskill and upskill workers has become shorter in the newly constrained labour market.** This applies to workers who are likely to stay in their roles as well as those who risk losing their roles due to rising recession-related unemployment and can no longer expect to retrain at work. For those workers set to remain in their roles, the share of core skills that will change in the next five years is 40%, and 50% of all employees will need reskilling (up 4%).

– **Despite the current economic downturn, the large majority of employers recognize the value of human capital investment.** An average of 66% of employers surveyed expect to get a return on investment in upskilling and reskilling within one year. However, this time horizon risks being too long for many employers in the context of the current economic shock, and nearly 17% remain uncertain on having any return on their investment. On average, employers expect to offer reskilling and upskilling to just over 70% of their employees by 2025. However, employee engagement into those courses is lagging, with only 42% of employees taking up employer-supported reskilling and upskilling opportunities.

– **Companies need to invest in better metrics of human and social capital through adoption of environmental, social and governance (ESG) metrics and matched with renewed measures of human capital accounting.** A significant number of business leaders understand that reskilling employees, particularly in industry coalitions and in public-private collaborations, is both cost-effective and has significant mid- to long-term dividends—not only for their enterprise but also for the benefit of society more broadly. Companies hope to internally redeploy nearly 50% of workers displaced by technological automation and augmentation, as opposed to making wider use of layoffs and automation-based labour savings as a core workforce strategy.

– **The public sector needs to provide stronger support for reskilling and upskilling for at-risk or displaced workers.** Currently, only 21% of businesses report being able to make use of public funds to support their employees through reskilling and upskilling. The public sector will need to create incentives for investments in the markets and jobs of tomorrow; provide stronger safety nets for displaced workers in the midst of job transitions; and to decisively tackle long-delayed improvements to education and training systems. Additionally, it will be important for governments to consider the longer-term labour market implications of maintaining, withdrawing or partly continuing the strong COVID-19 crisis support they are providing to support wages and maintain jobs in most advanced economies.

# Part 1
# Tracking the Future of Jobs

1

# The Labour Market Outlook in the Pandemic Economy

## 1.1 Introduction

Developing and enhancing human skills and capabilities through education, learning and meaningful work are key drivers of economic success, of individual well-being and societal cohesion. The global shift to a future of work is defined by an ever-expanding cohort of new technologies, by new sectors and markets, by global economic systems that are more interconnected than in any other point in history, and by information that travels fast and spreads wide. Yet the past decade of technological advancement has also brought about the looming possibility of mass job displacement, untenable skills shortages and a competing claim to the unique nature of human intelligence now challenged by artificial intelligence. The coming decade will require purposeful leadership to arrive at a future of work that fulfils human potential and creates broadly shared prosperity.

In 2020, economic globalization is stalling, social cohesion is being eroded by significant unrest and political polarization, and an unfolding recession is threatening the livelihoods of those at the lower end of the income spectrum. As a new global recession brought on by the COVID-19 health pandemic impacts economies and labour markets, millions of workers have experienced changes which have profoundly transformed their lives within and beyond work, their well-being and their productivity. One of the defining features of these changes is their asymmetric nature—impacting already disadvantaged populations with greater ferocity and velocity.

Over the course of half a decade the World Economic Forum has tracked the labour market impact of the Fourth Industrial Revolution, identifying the potential scale of worker displacement alongside strategies for empowering job transitions from declining to emerging roles. The fundamental rate of progress towards greater technological incursion into the world of work has only accelerated over the two years since the 2018 edition of the report. Under the influence of the current economic recession the underlying trends toward the technological augmentation of work have accelerated. Building upon the Future of Jobs methodology developed in 2016 and 2018, this 2020 third edition of the *Future of Jobs Report* provides a global overview of the ongoing technological augmentation of work, emerging and disrupted jobs and skills, projected expansion of mass reskilling and upskilling across industries as well as new strategies for effective workforce transitions at scale.

Over the past decade, a set of ground-breaking, emerging technologies have signalled the start of the Fourth Industrial Revolution. To capture the opportunities created by these technologies, many companies across the private sector have embarked on a reorientation of their strategic direction. By 2025, the capabilities of machines and algorithms will be more broadly employed than in previous years, and the work hours performed by machines will match the time spent working by human beings. The augmentation of work will disrupt the employment prospects of workers across a broad range of industries and geographies. New data from the Future of Jobs Survey suggests that on average 15% of a company's workforce is at risk of disruption in the horizon up to 2025, and on average 6% of workers are expected to be fully displaced.

This report projects that in the mid-term, job destruction will most likely be offset by job growth in the 'jobs of tomorrow'—the surging demand for workers who can fill green economy jobs, roles at the forefront of the data and AI economy, as well as new roles in engineering, cloud computing and product development. This set of emerging professions also reflects the continuing importance of human interaction in the new economy, with increasing demand for care economy jobs; roles in marketing, sales and content production; as well as roles at the forefront of people and culture.[1] Employers answering the Future of Jobs Survey are motivated to support workers who are displaced from their current roles, and plan to transition as many as 46% of those workers from their current jobs into emerging opportunities. In addition, companies are looking to provide reskilling and upskilling opportunities to the majority of their staff (73%) cognizant of the fact that, by 2025, 44% of the skills that employees will need to perform their roles effectively will change.

The sections that follow in this first chapter of the *Future of Jobs Report* situate the 2020 COVID-19 economic recession in the context of past recessions, and in the context of the Fourth Industrial Revolution. They review the impact of this health shock on the labour market, paying particular attention to its asymmetric nature. Chapter 2 outlines the latest evidence from the Future of Jobs Survey, taking stock of the path of technological adoption, the scale and depth of the job transitions and the learning provision that is in place and planned in the horizon up to 2024. Finally, Chapter 3 reviews the public and private sector policies and practices that can support a proactive adaptation to these unfolding trends. In particular, the chapter outlines the mechanisms for job transitions, the imperatives of creating a learning organization and structures which can support such adaptation both across government and across business.

This edition of the *Future of Jobs Report* takes stock of the impact of two twin events—the onset of the Fourth Industrial Revolution and of the COVID-19 recession in the context of broader societal and economic inequities. It provides new insights into effective practices and policies for supporting worker transitions towards a more equitable and prosperous future of work. In economies riddled with inequalities and sluggish adaptation to the demands of the new world of work, there is an ever-larger need for a 'Great Reset', which can herald opportunities for economic prosperity and societal progress through good jobs.

## 1.2 Short-term shocks and long-term trends

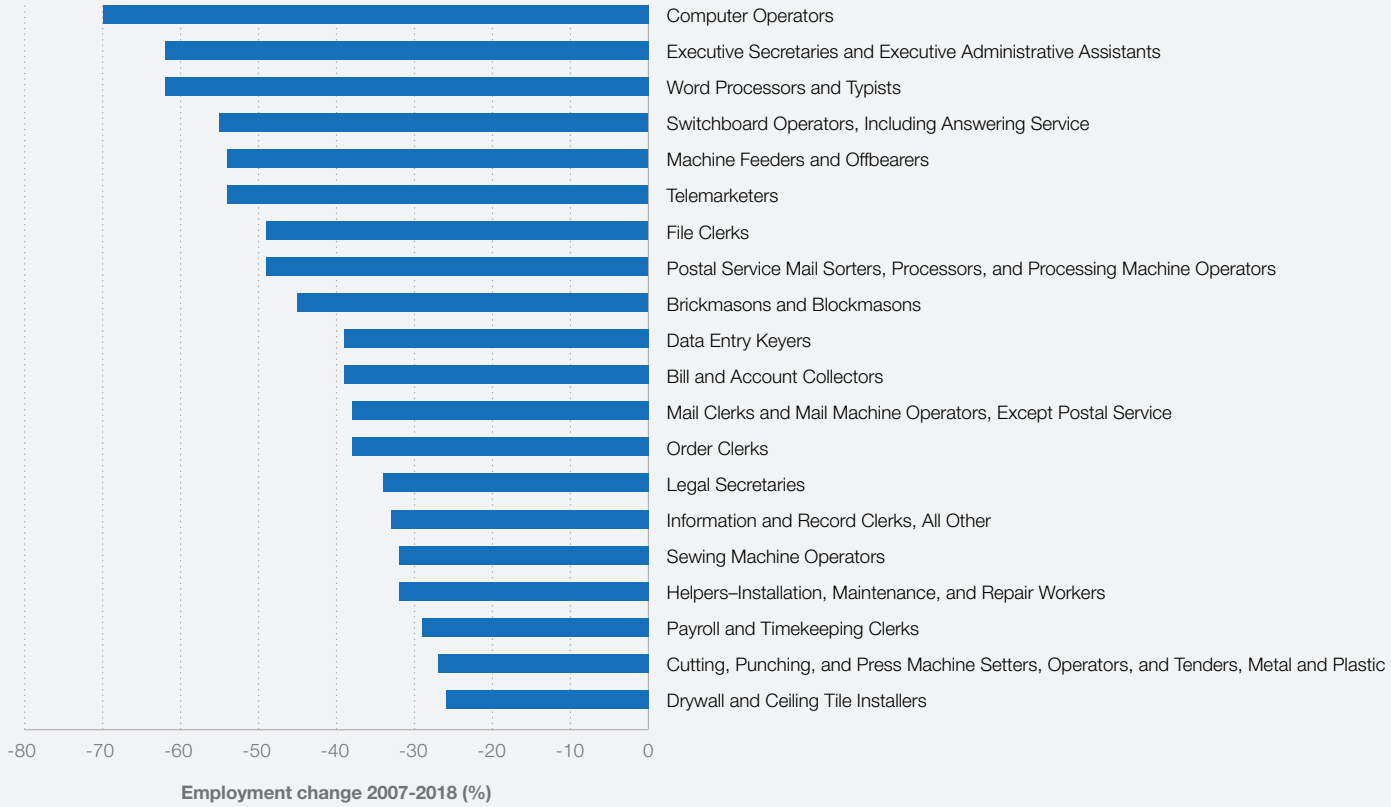
Over centuries, technological, social and political transformations have shaped economies and the capacity of individuals to make a living. The first and second Industrial Revolutions displaced trades that had thrived on older technologies and gave rise to new machines, new ways of work and new demand for skill sets that could harness the power of steam, coal and factory production. The transformation of production has consequently given rise to new professions and new ways of working that eventually paved the path to greater prosperity despite initial job displacement among individuals. Although in 2018 we proposed that the labour market impact of the Fourth Industrial Revolution can be managed while maintaining stable levels of employment, the current 2020 global recession has created a 'new normal' in which short-term and long-term disruptions are intertwined.

A significant volume of research has been published on the future of work since the World Economic Forum published it first edition. To date, the conclusions drawn from that body of literature appear to offer both hope and caution. The twin forces of technology and globalisation have brought profound transformations to labour markets and in the near term.[2] Few analysts propose that technological disruption will lead to shrinking opportunities in the aggregate,[3] and many of the insights gathered point to the emergence of new job opportunities. Across countries and supply chains, research has evidenced rising demand for employment in nonroutine analytics jobs accompanied by significant automation of routine manual jobs.[4] Empirically, these changes can be observed in data tracking employment trends in the United States between 2007–2018. The evidence indicates that nearly 2.6 million jobs were displaced over a span of a decade.[5] Figure 1 presents the types of roles that are being displaced—namely Computer Operators, Administrative Assistants, Filing Clerks, Data Entry Keyers, Payroll Clerks and other such roles which depend on technologies and work processes which are fast becoming obsolete.

In late 2019, the gradual onset of the future of work—due in large part to automation, technology and globalization—appeared to pose the greatest risk to labour market stability. The first half of 2020 has seen an additional, significant and unexpected disruption to labour markets, with immediate knock-on effects on the livelihoods of individuals and the household incomes of families. The COVID-19 pandemic appears to be deepening existing inequalities across labour markets, to have reversed the gain in employment made since the Global Financial Crisis in 2007–2008, and to have accelerated the arrival of the future of work. The changes heralded by the COVID-19 pandemic have compounded the long-term changes already triggered by the Fourth Industrial Revolution, which has, consequently, increased in velocity and depth.

In reaction to the risk to life caused by the spread of the COVID-19 virus, governments have legislated full or partial closures of business operations, causing a sharp shock to economies, societies and labour markets. Many businesses have closed their physical office locations and have faced limitations in doing business face-to-face. Figure 2 shows the trajectory of those closures. Beginning in mid-March and by mid-April, nearly 55% of economies (about 100 countries) had enacted workplace closures which affected all but essential businesses.[6] During May and June, economies resumed some in-person business operations—yet limitations to the physical operation of business continue, geographic mobility between countries persist and the consumption patterns of individuals have been dramatically altered. By late June 2020, about 5% of countries globally still mandated a full closure of in-person business operations, and only about 23% of countries were fully back to open.[7] In addition, irrespective of legislated measures, individuals have shifted to working remotely and enacting physical distancing.[8]

FIGURE 1 | **Employment trends for jobs in the United States at high risk of automation, 2007–2018**



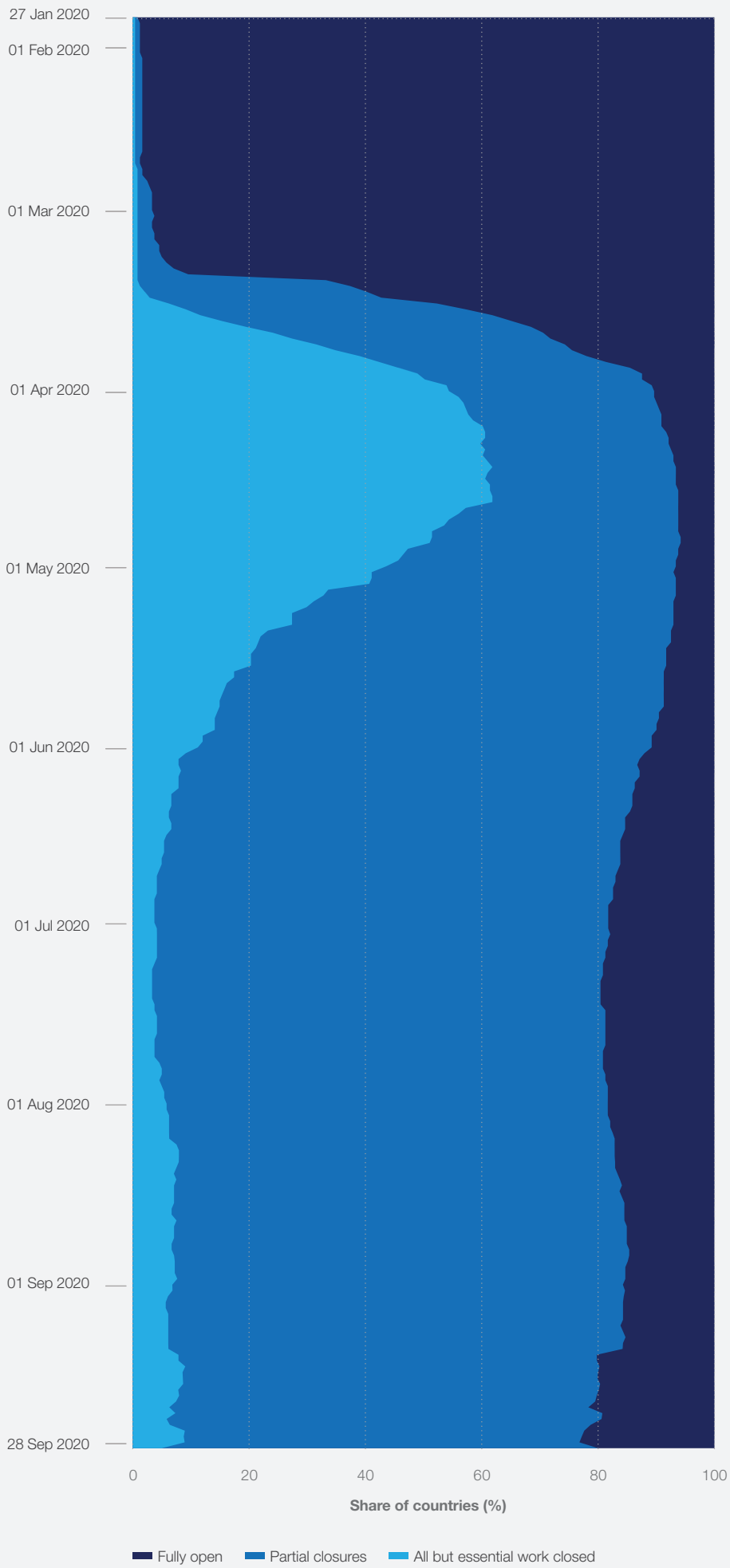

Source

Ding, et al, 2020.

Collectively, the life-preserving measures to stop the spread of the COVID-19 virus have led to a sharp contraction of economic activity, a marked decline in capital expenditure among several industries facing decline in demand for their products and services, and put new pressures on enterprises and sectors. Not all companies have been equally affected. Some businesses have the resources to weather the uncertainty, but others do not. Among those faltering are companies that typically don't hold large cash reserves such as SMEs (small-to-medium enterprises) or businesses in sectors such as Restaurants and Hospitality. Some types of business operations can be resumed remotely, but others, such as those in the Tourism or Retail sectors that depend on in-person contact or travel, have sustained greater damage (Figure 9 on page 17 demonstrates some of those effects).

The current health pandemic has led to an immediate and sudden spike in unemployment across several key economies—displacing workers from their current roles. Since the end of the Global Financial Crisis in 2007–2008, economies across the globe had witnessed a steady decrease of unemployment. Figure 3 presents the historical time series of unemployment across a selection of countries and regions. Annotated across the figure are the four global recessions which have throughout history impacted employment levels in significant ways. The figure shows that during periods of relative labour market stability unemployment stands at near or around 5% while during periods of major disruption unemployment peaks at or exceeds 10%. During the financial crisis of 2010, unemployment peaked at 8.5% only to drop to an average of 5% across OECD economies in late 2019.[9] According to the International Labour Organization (ILO), during the first half of 2020 real unemployment figures jumped to an average of 6.6% in quarter 2 of 2020. The OECD predicts that those figures could peak at 12.6% by the end of 2020 and still could stand at 8.9% by end 2021.[10] This scenarios assumes that the economies analysed experience two waves of infection from the COVID-19 virus accompanied by an associated slow-down of economic activity. It remains unclear whether current unemployment figures have peaked or whether job losses will deepen over time. New analysis conducted by the IMF has estimated that 97.3 million individuals, or roughly 15% of the workforce in the 35 countries included in the analysis, are classified as being at high risk of being furloughed or made redundant in the current context.[11]

FIGURE 2 | **Countries enacting workplace closures, February–September 2020**



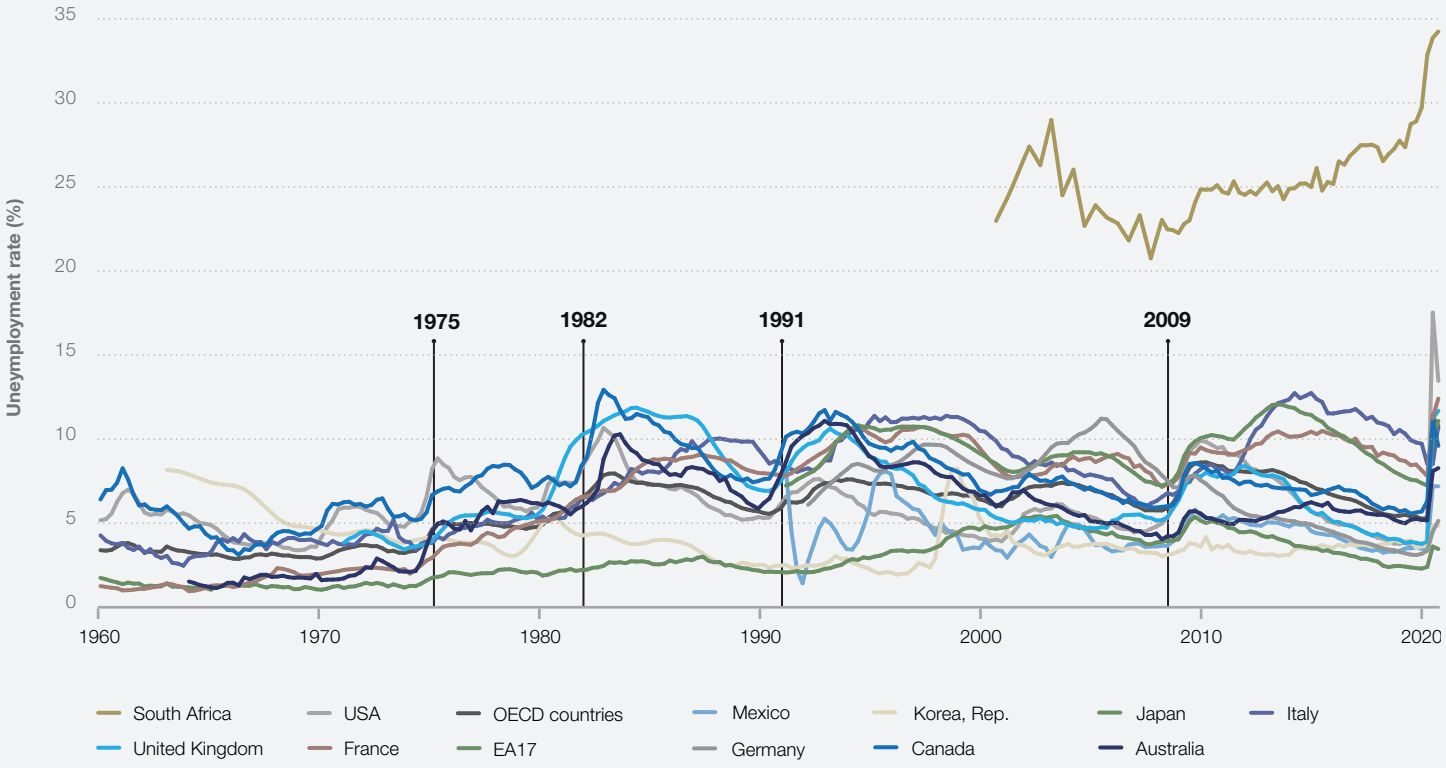

Source

Hale, et al, 2020.

Countries have taken different approaches to tackling the pandemic, in the established provision of social protection to displaced workers and in newly enacted temporary government schemes targeted at job retention. This has created varied trajectories of labour market disruption and recovery. For instance, several economies, such as Germany and Italy, have established large-scale temporary job retention schemes including wage support measures (commonly called furlough schemes). According to the latest estimates such schemes have in recent months subsidized the wages of close to 60 million workers.[12] While initially more temporary in nature, the persistence of limits to economic activity caused by COVID-19 has led to an extension of several job retention schemes up to the end of 2021 in an effort to prevent sudden spikes in unemployment.[13] While such measures have meant that unemployment figures in those economies have stayed relatively stable, it is yet to be seen if these trends hold after they are lifted.

FIGURE 3

**Unemployment rate, selected countries and regions, 1960–2020**




Source

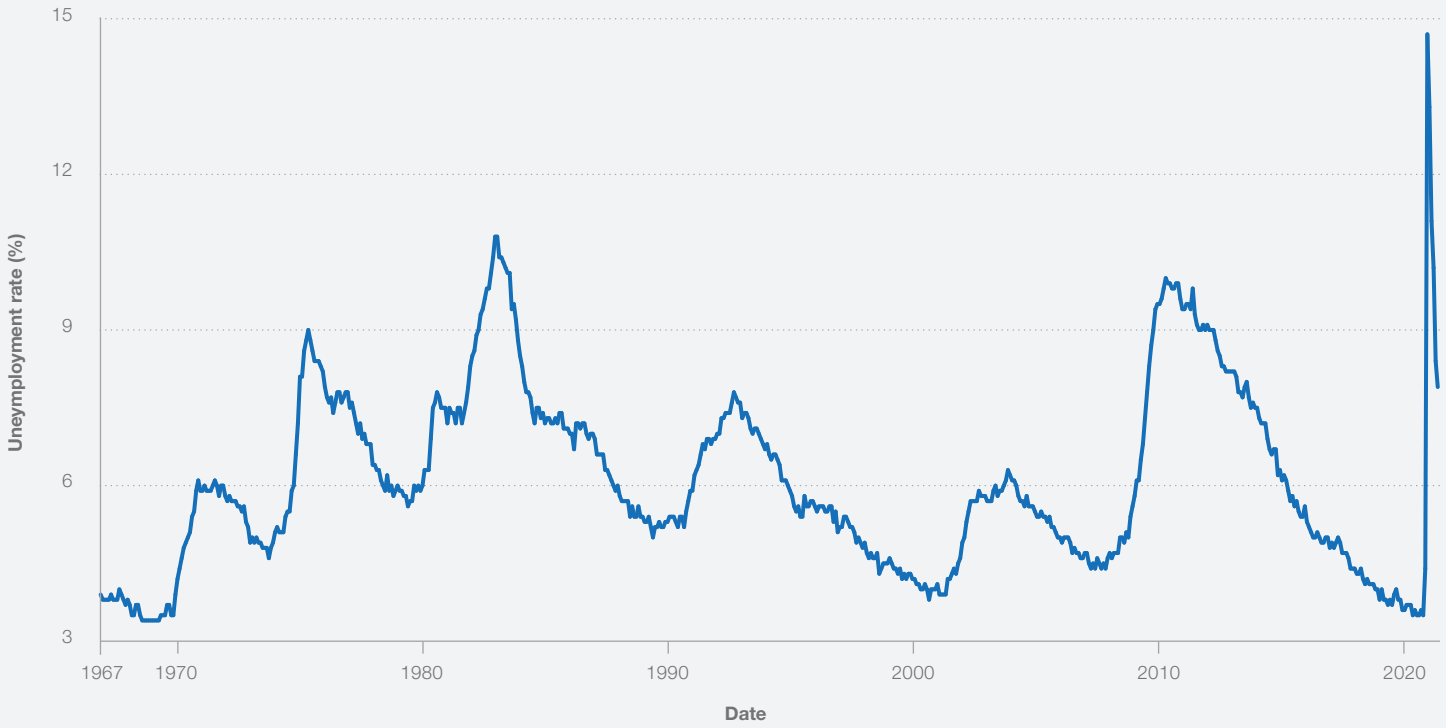
OECD Economic Outlook: Statistics and Projections, and Kose, M. Ayhan, et al. 2020.

Notes

Forecasts for Q3 2020 produced by the OECD assuming two waves of COVID-19, namely a "double hit" scenario. EA17 = Belgium, Germany, Estonia, Ireland, Greece, Spain, France, Italy, Cyprus, Luxembourg, Malta, Netherlands, Austria, Portugal, Slovenia, Slovakia, and Finland.

Comparing figures for quarter 2 of 2020 to the same quarter in 2019, unemployment in Australia increased by 1.5 percentage points; in Brazil that same figure was 1.6; in Canada, 6; in Chile, 5.5; Columbia, 9; and United States, 8.5. The relevant statistics for countries such as the United Kingdom, Germany, Japan, France and Italy show greater resilience. The Country Profiles in Part 2 of this report present key labour market indicators showcasing the latest annual, monthly and quarterly figures for the economies covered in this report, including the figures listed above. It is evident that the United States and Canada experienced a significant disruption on an unprecedented scale. Employment figures for the United States illustrated in Figure 4 show that the unemployment rate rose from 3.5% in February 2020 to peak at 14.7% in April 2020. The unemployment rate for the United States has now dropped to stand closer to 10%. In contrast, during the Global Financial Crisis in 2009 the unemployment rate in the United States rose from 4.7% in December 2007 to nearly 10% by June 2009.[14] In two months the COVID-19 pandemic has destroyed more jobs than the Great Recession did in two years. As the United States has lifted restrictions on the physical movement of people, some workers have been recalled into employment while others have seen temporary redundancies become permanent job displacement (some of this data can be observed in Figure 11 on page 19).

FIGURE 4 | **Unemployment rate in the United States, seasonally adjusted, 1967–2020**




Source

United States Bureau of Labor Statistics.

Notes

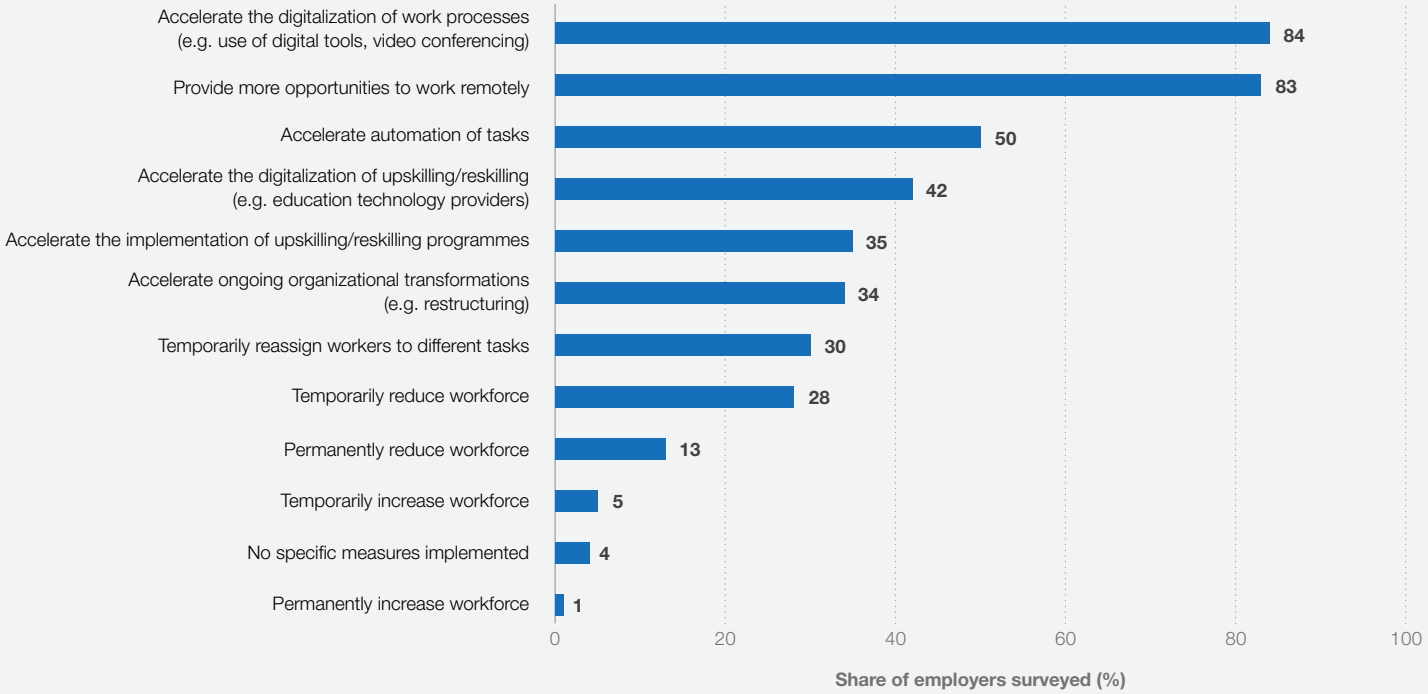
Unemployment Rate, also defined as the U-3 measure of labor underutilization, retrieved from FRED, Federal Reserve Bank of St. Louis

It appears increasingly likely that changes to business practice brought about by this pandemic are likely to further entrench wholly new ways of working, and that the second half of 2020 will not see a return 'back to normal' but will instead see a return to 'the new normal'.

Early evidence from the World Economic Forum's Future of Jobs Survey presented in Figure 5 suggests that, in addition to the labour market displacement caused by this health shock, employers are set to accelerate their job automation and augmentation agenda, raising the possibility of a jobless recovery. Among the business leaders surveyed, just over 80% report that they are accelerating the automation of their work processes and expanding their use of remote work. A significant 50% also indicate that they are set to accelerate the automation of jobs in their companies. In addition, more than one-quarter of employers expect to temporarily reduce their workforce, and one in five expect to permanently do so. The International Labour Organization (ILO) projects that by the second quarter of 2020, the equivalent of 195 million workers will have been displaced and as jobs are transformed at a greater speed.[15]

While many workers moved into unemployment during the period of mid-March to the end of July hiring rates also remained low, reflecting business reluctance to invest in new personnel. This means that workers displaced from the labour market have fewer opportunities to return to work as businesses reduce their workforce. This trend can be observed through data from the professionals on the LinkedIn platform, which allows the LinkedIn Economic Graph team to track changes in hiring rates for seven key economies—Australia, China, France, Italy, Singapore, the United Kingdom and the United States. Those hiring rates are featured in Figure 6. They show that in China, for instance, hiring contracted to a low of -47% year-on-year rate at the end of February. In France and Italy, the contraction was more pronounced, reaching -70% and -64.5%, respectively, in mid-April. Those low figures were approached by the United Kingdom and Australia, where contractions reached a relatively more robust -40%. Since then, hiring rates have gradually rebounded, with most of the seven key economies tracked by these metrics trending towards a 0% year-on-year change. By 1 July, China, France and the United States had seen the most recovery in comparative hiring rates, at -6% or -7%. By the end of September the countries with the strongest recovery in hiring were China (22%), Brazil (13%), Singapore (8%) and France (5%). In those economies it appears that hiring is now compensating for the months in which new personnel were not engaged, indicating some stabilization of the labour market.

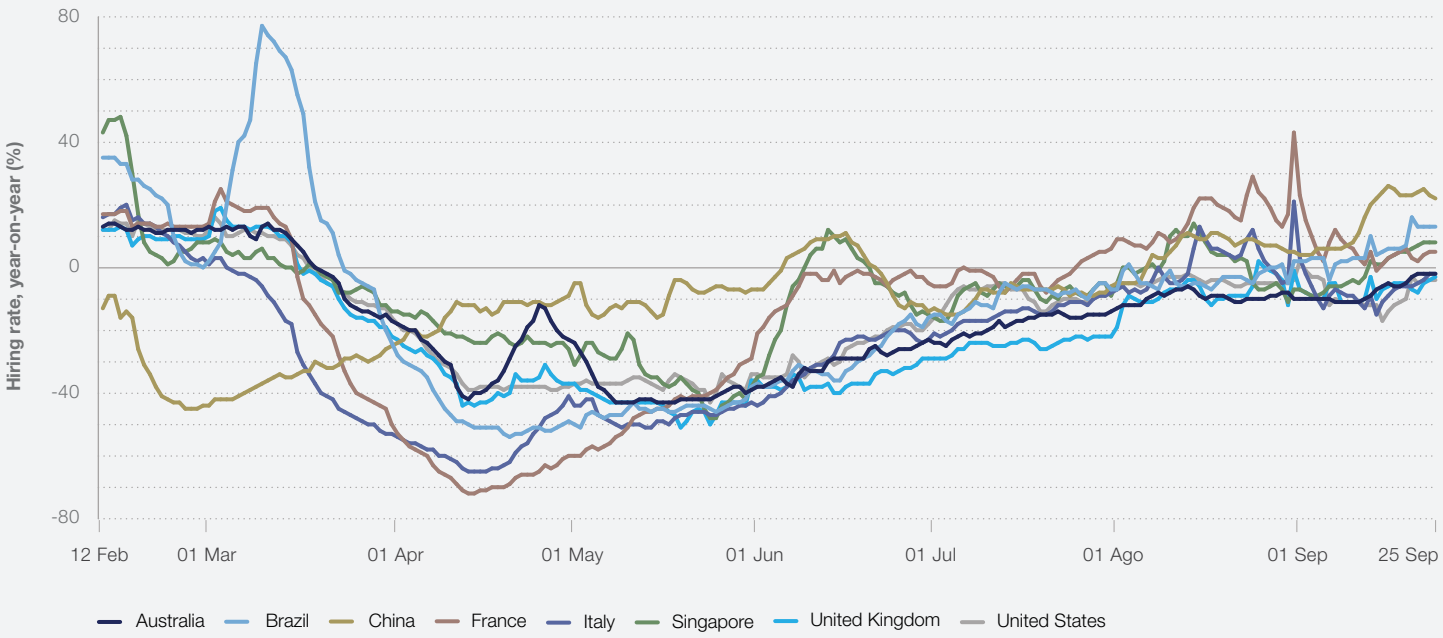
FIGURE 5 | **Planned business adaptation in response to COVID-19**




Source

Future of Jobs Survey 2020, World Economic Forum.

FIGURE 6 | **Hiring rate trends in selected countries, February–October 2020, year-on-year changes**




Source

LinkedIn Economic Graph.

FIGURE 7 | Hiring rate trends in selected countries, by industry, April-September 2020, year-on-year changes

| Industry | Country/Economy | April (month) | May (month) | June (month) | July (month) | August (month) | 25 September (14-day rolling average) |
|---|---|---|---|---|---|---|---|
| **All** | | **-41%** | **-39%** | **-13%** | **-11%** | **4%** | **-4%** |
| | Australia | -34% | -41% | -23% | -19% | -3% | -11% |
| | Brazil | -51% | -46% | -21% | -8% | -2% | 3% |
| | China | -11% | -11% | 2% | -8% | 10% | 11% |
| | France | -67% | -40% | 3% | -3% | 24% | 3% |
| | Italy | -57% | -48% | -22% | -13% | 2% | -11% |
| | Singapore | -25% | -39% | 3% | -9% | 4% | -5% |
| | United Kingdom | -42% | -45% | -27% | -19% | -4% | -11% |
| | United States | -40% | -39% | -19% | -11% | 0% | -11% |
| **Consumer Goods** | | **-61%** | **-53%** | **-27%** | **-22%** | **-5%** | **-14%** |
| | Australia | -44% | -50% | -24% | -21% | -11% | -12% |
| | France | -75% | -50% | -13% | -12% | 8% | -3% |
| | Italy | -76% | -62% | -35% | -27% | -8% | -31% |
| | United Kingdom | -56% | -55% | -40% | -31% | -11% | -8% |
| | United States | -53% | -48% | -21% | -16% | -2% | -14% |
| **Finance** | | **-42%** | **-38%** | **-21%** | **-13%** | **3%** | **-7%** |
| | Australia | -19% | -37% | -27% | -28% | -1% | -7% |
| | France | -72% | -41% | 1% | -8% | 12% | 6% |
| | Italy | -48% | -41% | -31% | -3% | 7% | -9% |
| | United Kingdom | -39% | -37% | -34% | -23% | -13% | -18% |
| | United States | -33% | -34% | -14% | -3% | 9% | -6% |
| **Health Care** | | **-23%** | **-22%** | **6%** | **1%** | **23%** | **8%** |
| | Australia | -12% | -26% | -1% | 6% | 19% | 14% |
| | France | -54% | -19% | 37% | 10% | 40% | 17% |
| | Italy | -29% | -27% | 2% | 0% | 26% | 1% |
| | United Kingdom | 10% | -4% | 1% | -5% | 18% | 7% |
| | United States | -28% | -33% | -11% | -6% | 14% | 0% |
| **Manufacturing** | | **-53%** | **-45%** | **-20%** | **-18%** | **3%** | **-6%** |
| | Australia | -34% | -31% | -18% | -12% | 3% | 5% |
| | France | -71% | -39% | -1% | -14% | 20% | -8% |
| | Italy | -61% | -54% | -34% | -18% | -4% | -16% |
| | United Kingdom | -51% | -55% | -38% | -32% | -4% | -4% |
| | United States | -47% | -47% | -12% | -13% | 3% | -8% |
| **Recreation & Travel** | | **-79%** | **-74%** | **-43%** | **-32%** | **-20%** | **-28%** |
| | Australia | -77% | -77% | -51% | -44% | -43% | -50% |
| | France | -82% | -70% | -15% | -8% | 11% | -5% |
| | Italy | -87% | -78% | -40% | -28% | -15% | n/a |
| | United Kingdom | -73% | -77% | -63% | -50% | -23% | -26% |
| | United States | -75% | -69% | -44% | -32% | -28% | -31% |
| **Retail** | | **-53%** | **-47%** | **-15%** | **-5%** | **13%** | **4%** |
| | Australia | -38% | -44% | -18% | -6% | 9% | 5% |
| | France | -68% | -38% | 21% | 9% | 41% | 20% |
| | Italy | -73% | -58% | -27% | 7% | 10% | -1% |
| | United Kingdom | -42% | -48% | -28% | -22% | 1% | 2% |
| | United States | -46% | -48% | -24% | -13% | 6% | -8% |
| **Software & IT Services** | | **-38%** | **-36%** | **-15%** | **-22%** | **-3%** | **-14%** |
| | Australia | -27% | -37% | -24% | -23% | -4% | -12% |
| | France | -61% | -35% | -7% | -24% | 0% | -20% |
| | Italy | -43% | -44% | -24% | -16% | -2% | -10% |
| | United Kingdom | -31% | -39% | -6% | -27% | -6% | -16% |
| | United States | -28% | -26% | -14% | -22% | -2% | -12% |

Source

LinkedIn Economic Graph.

Note

Values in brown indicate where the hiring rate is lower than in 2019, while values in green indicate where the rate is higher than 2019.

The darker the colour, the lower/higher the rate.

This tentative rebound is not equally distributed across industries. Figure 7 shows the year-on-year change in hiring rates throughout April, May, June, July, August, and most of September for seven key industries and the seven economies tracked by LinkedIn. Among the notable findings are those indicating a persistent hiring slump in Recreation and Travel, Consumer Goods and Manufacturing. Also striking is that the Software and IT sector, which is not shedding jobs at the same rate as other industries, is also not hiring at the same rate as this time last year. The same observation also holds for the Finance Industry. It is perhaps not surprising that the Health and Healthcare industry has maintained the closest to comparable hiring rates to this time last year.

In sum, unemployment and hiring rates suggest a significant number of individuals were displaced across labour markets over the month of April 2020. While those figures have stopped trending in a negative direction in the period up to July 2020, this recovery remains tentative, with unequal geographic and industry patterns. Longer persistence of these trends is likely to entrench labour market scarring, lead to an overall reduction in employment and entrench worker displacement.

## 1.3 The remote and hybrid workforce

As a result of the twin forces of the Fourth Industrial revolution and the COVID-19 recession, day-to-day digitalization has leapt forward, with a large-scale shift to remote working and e-commerce, driving a surge in work-from-home arrangements and a new marketplace for remote work. However, it has also brought about significant well-being challenges as workers have struggled to adapt to new ways of work over a short period of time.

In the COVID-19 context, workers have been segmented into three categories: 1) 'essential workers' such as delivery personnel, carers and health workers, food shop workers, agricultural workers and manufacturers of medical goods; 2) 'remote workers' who can work remotely and are likely to keep their jobs; and 3) 'displaced workers' who have been displaced from their jobs in the short term and potentially in the future, and who fall disproportionately into the sectors most negatively affected by the pandemic—Hospitality, Retail, Service work as well as Travel and Tourism.

All three types of workers are facing a wholesale shift in working practices, which now require new types of resilience and entail a reskilling or upskilling agenda. For essential workers, physical safety remains a paramount concern. Displaced workers are facing significant job uncertainty, and a short-term or permanent need to shift roles. Remote workers are faced with potential well-being and mental health challenges due to extensive changes to working practices as well as new areas of exclusion such as access to digital connectivity, living circumstances and the additional care responsibilities faced by parents or those looking after elderly relatives.[16]

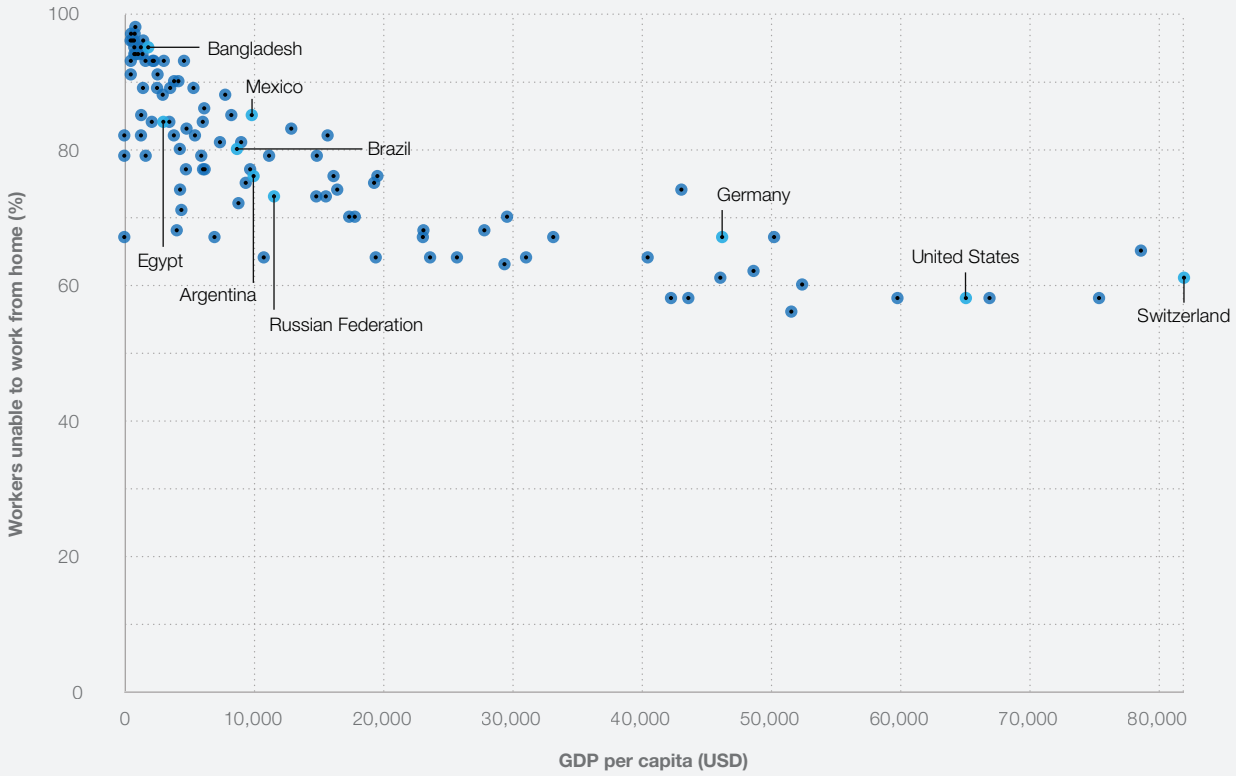
New evidence from Chief Human Resource Officers completing the Forum's Future of Jobs 2020 Survey indicates that, on average, 44% of workers are able to work remotely during the COVID-19 crisis while 24% of workers are unable to perform their current role. This estimate indicates an aspiration to expand the availability of remote work. The current theoretical share of jobs that can be performed remotely in any given economy has been approximated at 38% of jobs in high-income countries, 25% in upper-middle income economies, 17% in lower-middle income economies and 13% in low-income economies.[17] When adjusted to account for disparities in internet access by economy, the same figures decrease to 33.6% of jobs in high income economies, 17.8% of jobs in upper-middle income economies, 10% of jobs in lower-middle income economies, and just 4% of jobs in low income economies.[18] Figure 8 plots the estimated share of workers unable to work remotely against the GDP per capita for each country. According to such estimates around 60% of workers in high-income countries such as the United States and Switzerland are unable to fully work from home. This figure rises to more than 80-90% for economies such as Egypt and Bangladesh.

Sectoral differences underpin the estimates shared above. A larger share of roles in the Finance and Insurance and Information and Professional Services sectors can be performed remotely, while Accommodation and Food Services, Agriculture, Retail, Construction, Transportation and Warehousing offer fewer opportunities for remote work.[19] Figure 9 presents one estimate of the associated risk to employment across different sub-industries: 47% of workers in the Accommodation and Food Services sector, 15% in Wholesale and Retail Trade and 15% of the workforce in Transportation are at risk of unemployment.

Despite the limitations listed above, demand from employers for remote-based work is increasing rapidly across economies. Insights from the Glassdoor online platform show that access to working from home has nearly doubled since 2011, from 28% to 54% of workers mentioning that they had the opportunity to work from home.[20] The industries with the largest opportunity to work from home are the Information Technology and Insurance industries, with 74% of workers in those industries reporting having access to remote working. But there are also industries such as Finance, Legal work and Business Services, which could, in theory, perform more remote work.

FIGURE 8

## Estimated share of workers unable to work from home, by per capita GDP

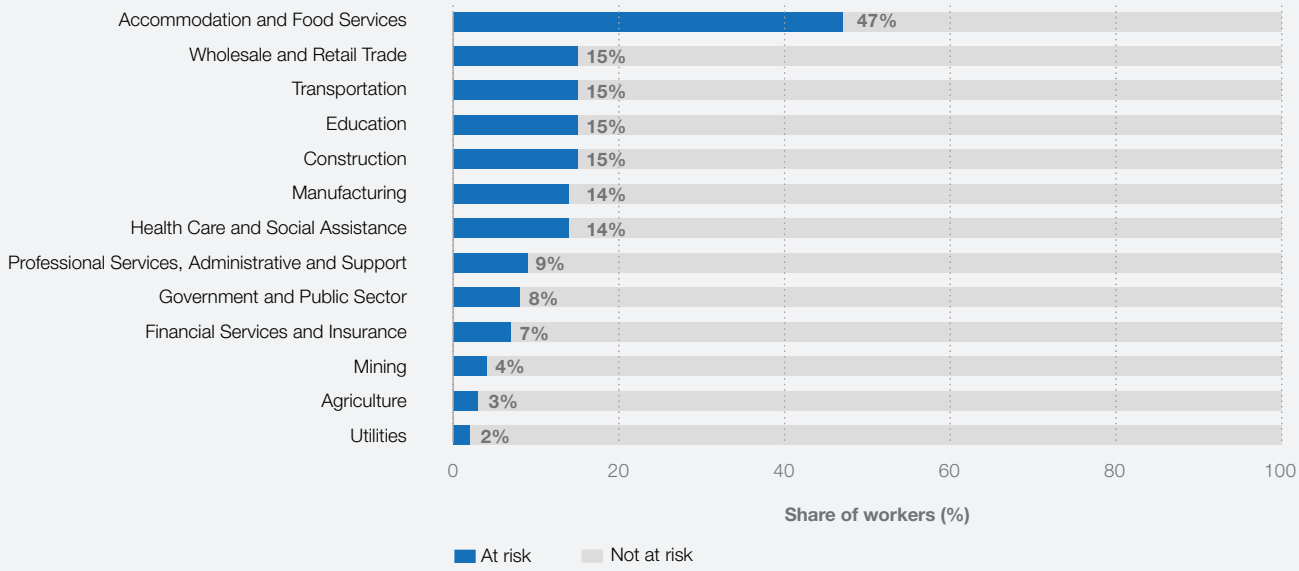



Source

Dingel & Neuman, World Bank Home Based Work (HBW) index, World Bank's *World Development Indicators* database.

FIGURE 9

## Estimated share of workers at risk of unemployment, by sub-industry




Source

Brussevich, et al, 2020.

Data shared by the LinkedIn Economic Graph team demonstrates that, in addition to established patterns of working from home and the theoretical potential for at-home work, there is actually an emerging marketplace for remote work–as evidenced by both strong demand from jobseekers[21] as well as an increasing demand from employers for jobs that are based remotely.[22] The index of job searches and job postings displayed in Figure 10 show that the amount of workers looking for remote job opportunities has nearly doubled, while the number of job postings (controlling for shifts in hiring rates) has gradually increased—with peaks of a two-fold increase in mid-April and a three-fold increase in mid-June.[23] In addition, workers in those industries surveyed for the LinkedIn Workforce Confidence Index believe there is potential to expand the use of remote work beyond what it has been historically to match the theoretical potential of working from home.[24]

The pandemic has shown that a new hybrid way of working is possible at greater scale than imaged in previous years, yet business leaders remain uncertain about the productivity outcomes of the shift to remote or hybrid work. Overall, 78% of business leaders expect some negative impact of the current way of working on worker productivity, with 22% expecting a strong negative impact and only 15% believing that it will have no impact or a positive impact on productivity. Such scepticism is likely to reflect a number of factors: 1) the switch to remote work is occurring during a period of additional stress and concern caused by the risk to life and health of the COVID-19 virus; 2) those caring after young children are faced with additional pressures—needing to take on more unpaid care work due to the intermittence of school and nursery arrangement; 3) while companies with established remote work practices are accustomed to a range of approaches to maintaining a sense of community, of active collaboration and ensuring a flow of communication, newly remote companies are still establishing these ways of communicating and coordinating in the new, post-pandemic world of work.

The Future of Jobs Survey indicates that company adaptation to the newly remote and hybrid workplace is already underway. Ensuring employee well-being is among the key measures undertaken by business leaders looking to effectively shift to remote work. In particular, 34% of leaders report that they are taking steps to create a sense of community among employees online and looking to tackle the well-being challenges posed by the shift to remote work.

FIGURE 10 **The new marketplace for remote work**

A. Changes to job-seeking behaviour, February-June 2020

B. Changes to job-posting behaviour, February-June 2020

Source

LinkedIn Economic Graph.

1.4

# Impact on equality

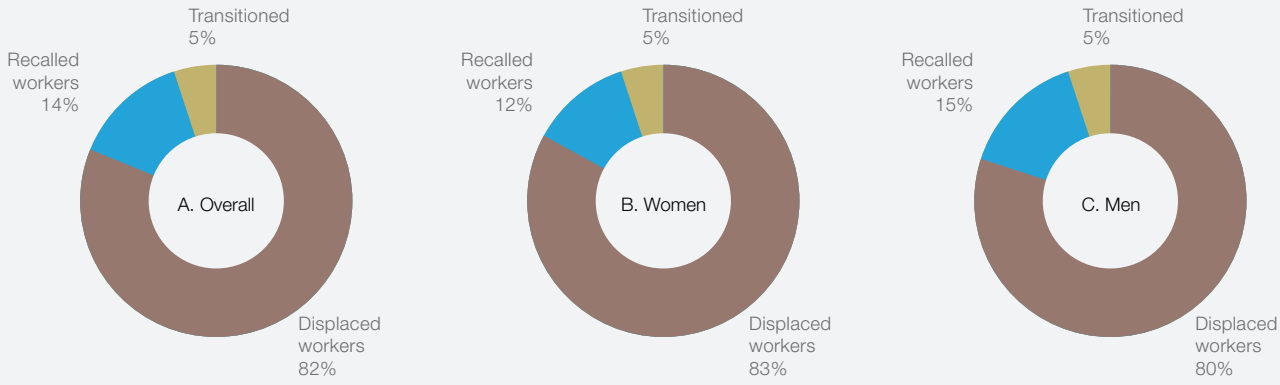
The individuals and communities most affected by the unprecedented changes brought about by COVID-19 are likely to be those which are already most disadvantaged—living in neighbourhoods with poor infrastructure, who have poor employment prospects and whose income does not equip them with a comfortable living standard, healthcare coverage or savings.[25] Furthermore, across several countries, the pandemic is set to broaden. An estimated 88 to 115 million people could fall back into extreme poverty in 2020 as a result of this recession.[26] The following wide array of characteristics typically pose a risk of social and economic exclusion among these populations: age and generation; gender and gender expression; sexual orientation; mental and physical abilities; level of health; race, ethnicity and religion; in-country geographic location, such as rural and urban. These characteristics are typically reflected in outcomes such as levels of education, employment type, income level and socio-economic status.[27]

In some countries those affected have been disproportionately women, for whom the ILO reports higher unemployment rates. This is the case in the United States, Germany and Australia. In the United States between December and April 2020, women's unemployment rose by 11% while the same figure for men was 9%. In Germany those figures were 1.6% and 0.8%, respectively. New sources of data can add more granularity to these trends. ADP Research Institute (ADPRI) has been able to track the impact of COVID-19 on the United States labour market in near real time.[28] The data shows that, within the observable shifts of workers' employment over the period of February to May, 25% of workers left or were asked to leave their current role. Of those 25%, 82% of workers tracked by APDRI dropped out of employment and become displaced workers,[29] 14% of workers were initially displaced and then recalled by their companies, and just 5% made successful transitions elsewhere in the labour market (Figure 11). The data shows variations by gender, age and wage level. As revealed in Figure 12, women make up a smaller share of both those who were retained by companies and of those who are recalled. Displaced workers are in fact on average more female, younger and have a lower wage.

The metrics shared by ADPRI also reveal the effect of this disruption by industry and wage level. Figure 13 A details the industries which are most affected by the current disruption; in particular, workers in Arts, Entertainment, and Recreation, and Accommodation and Food Services. Significant numbers of workers have also been displaced from the Retail sector as well as from the Real Estate, Rental and Leasing sector. In addition to this measure of attrition, Figure 13 B presents an overview of the workers who transitioned in and out of jobs during the same period; in effect, the re-allocation of workers by industry sector. The data shows that, on average, workers who did transition moved towards sectors which provide essential services such as Retail and Health, as well as sectors which have been less disrupted, such as Financial Services and Construction. Across these transitions, workers were also able to increase their wages. By contrast, struggling sectors such as Arts, Entertainment and Recreation as well as Accommodation and Food Services gained fewer workers than they lost in the February to May period—and workers who transitioned to those sectors appear to have taken a pay cut, suggesting necessity rather than desirability dictated the change.

FIGURE 11

**Outcomes for workers who lost their jobs in the United States, February–May 2020, by gender**

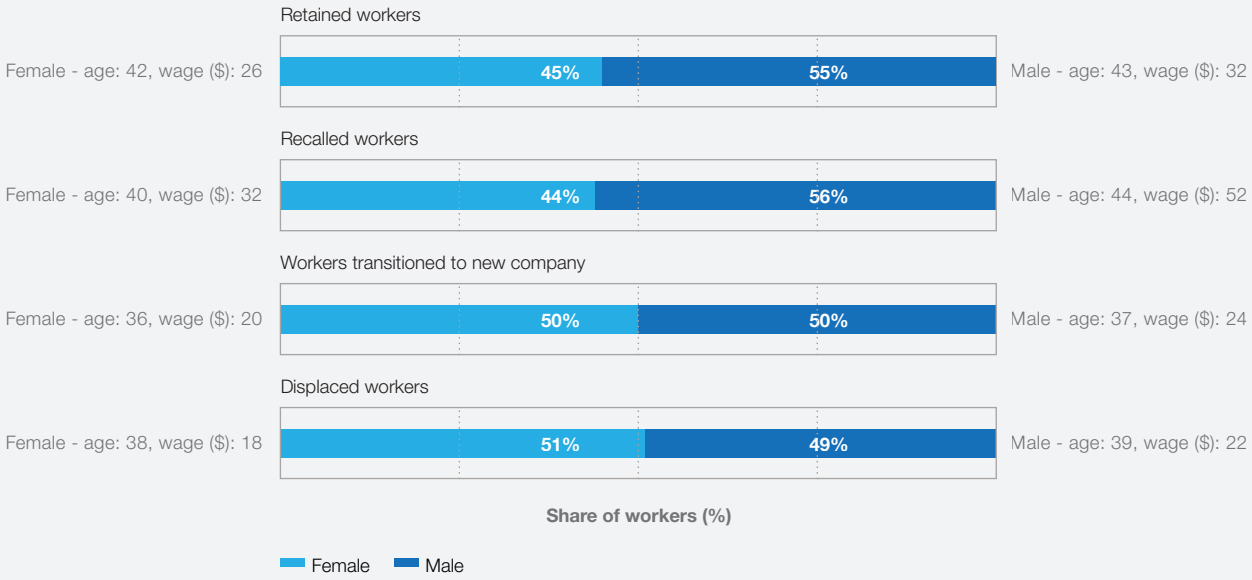



Source

ADP Research Institute, produced for the World Economic Forum's New Metrics CoLab.

FIGURE 12

**Retained, recalled, transitioned and displaced workers in the United States, by gender and by category of affected worker**




Source

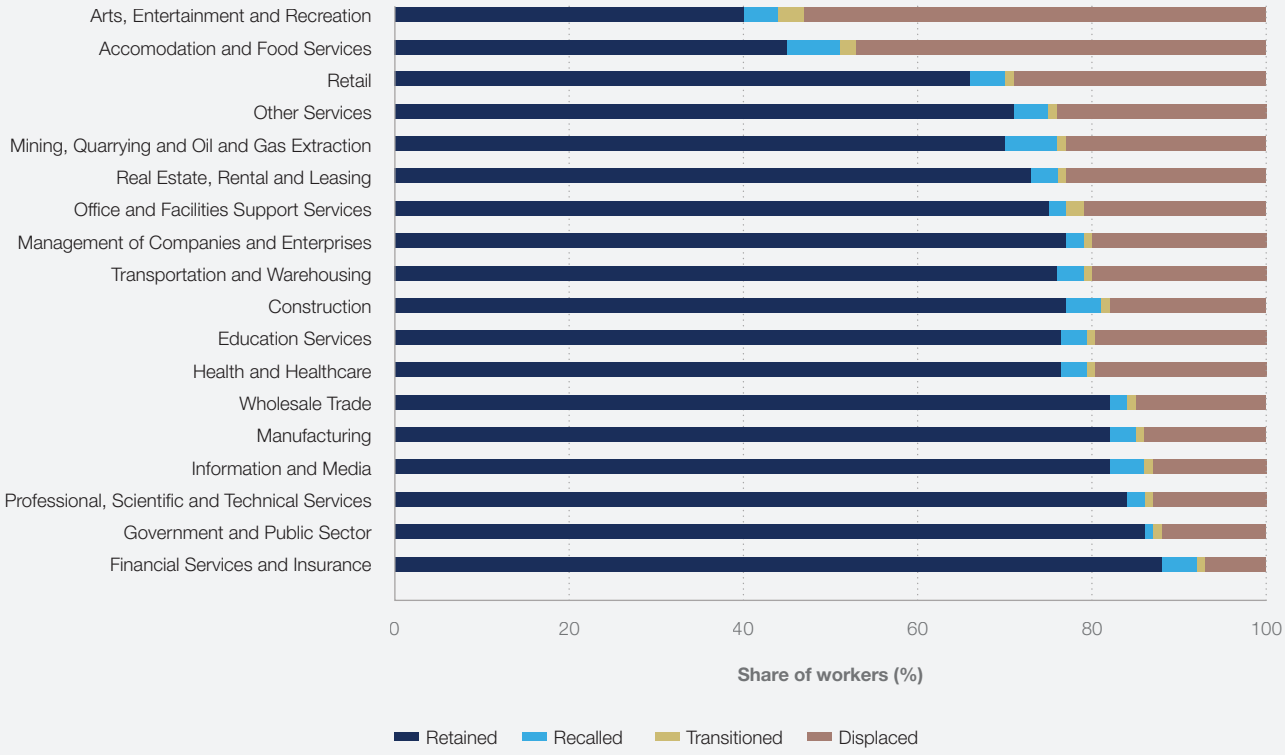
ADP Research Institute, produced for the World Economic Forum's New Metrics CoLab.

Figures 13 C and 13 D present the wage and age dynamics of workers in the United States who were retained, recalled, displaced or transitioned. The markers in brown denote displaced workers; in gold, those who transitioned to new opportunities; in light blue, those who were recalled; and in dark blue, those who were retained. Those recalled into the labour market have the highest average wage of the four cohorts, and those who are displaced have the lowest average wage. In Retail, those who were displaced earn on average a low $17.80 an hour while those recalled are earning $27.00 an hour. In Information and Media, those displaced earn $28.70 an hour while those recalled earn $61.20 an hour.

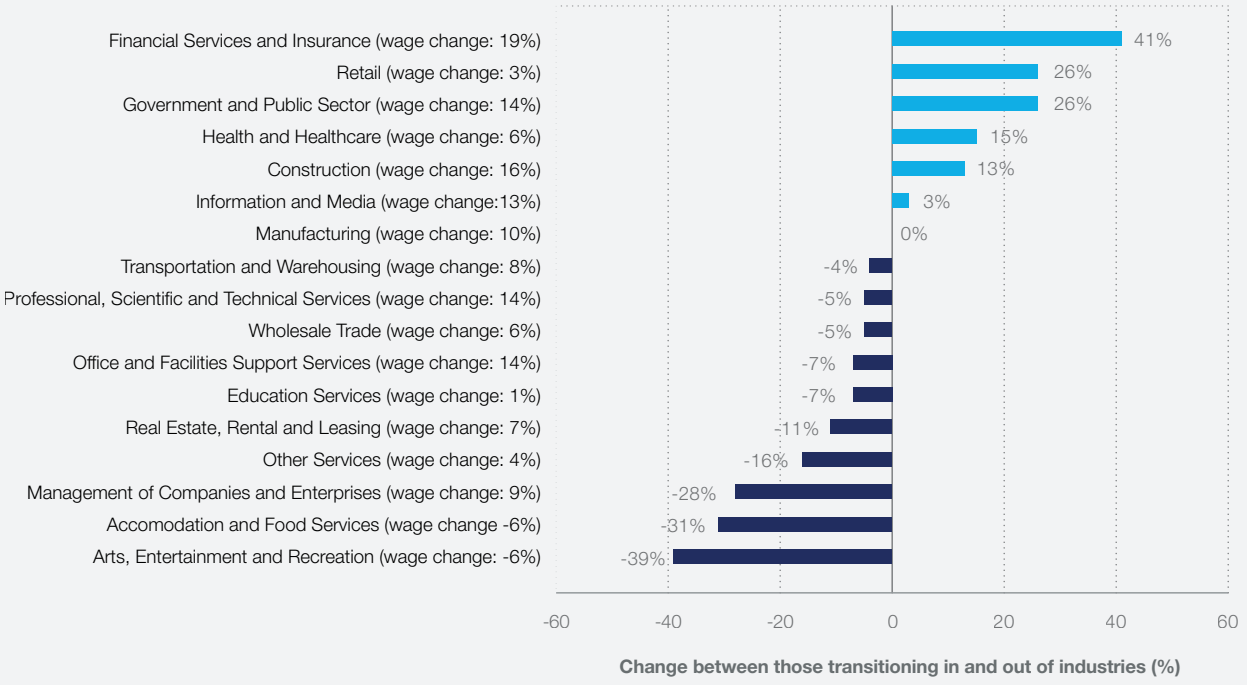
In addition, retained and recalled workers are, on average older, aged 40 and above, while displaced workers are more typically in their mid-to-late thirties or have just turned 40. For example, in Education Services, those displaced are on average aged 35, while those retained at nearing 43. In Retail and in Accommodation and Food Services these average ages are distorted by the relative youth of both sectors. In Retail, the average age for a displaced worker is 34, while those retained are nearing 40. Across the board, younger workers (those in their 30s) are more likely to have transitioned to new roles during these uncertain times.

Across established labour market indicators, unemployment figures for those with basic education are typically higher than for those who have completed a tertiary education degree. Current ILO figures list unemployment levels among those with an advanced degree as 6.5% and among those with basic education as 7.5%. The latest available figures by economy are listed in the Country Profiles in Part 2 of the report. It must be noted that such figures are still too rarely collected and that more timely unemployment figures remain unreliable. This trend can be further confirmed by focusing on country-level data with strong availability. Figure 14 presents unemployment levels among workers in the United States by education level over time. It shows that the unemployment rate among those with less than secondary education peaked at 21.2% in April, and stills stands at 12.6% as of the end of August. On the other hand, unemployment levels among workers who hold at least a tertiary degree spiked at 8.4% in April and stands at 5.3% as of the end of August. Comparing the impact of the Global Financial Crisis of 2008 on individuals with lower education levels to the impact of the COVID-19 crisis, it is clear that the impact today is far more significant and more likely to deepen existing inequalities.

## A. Affected workers by sub-industry



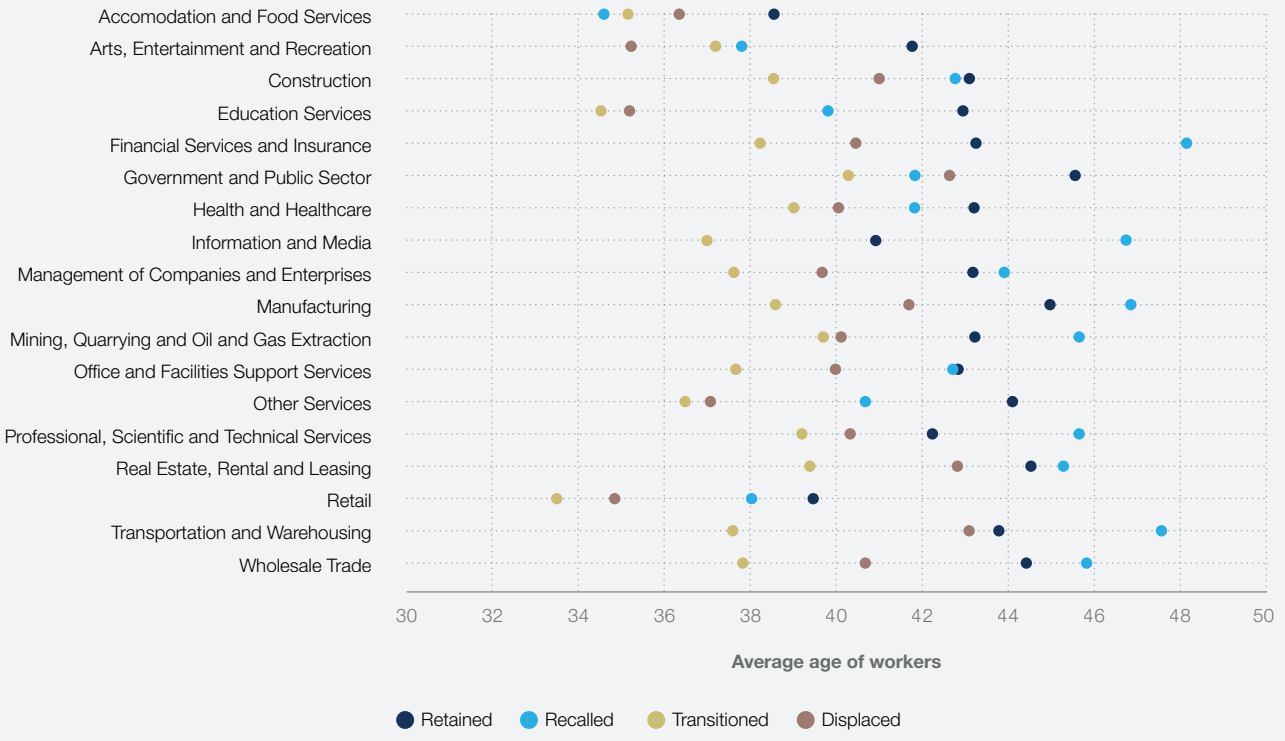

## B. Worker transitions into sub-industries, by relative volume of transitions and wage change accepted



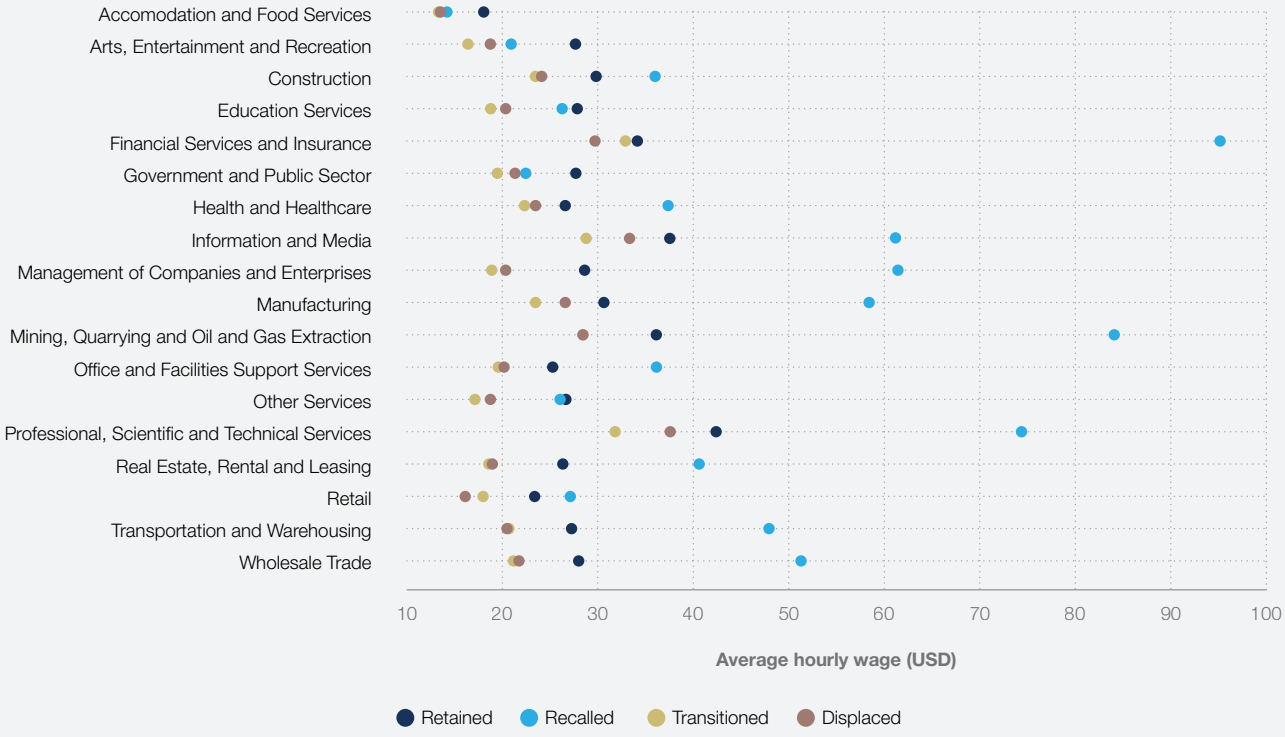

Note

The wage change value shows the difference of starting and ending wage as a share of the starting wage. It is calculated from data showing transitions from one industry to another as the unweighted median wage change of transitions from all other industries into the destination industry.

## C. Affected workers by sub-industry and age




## D. Affected workers by industry and wage

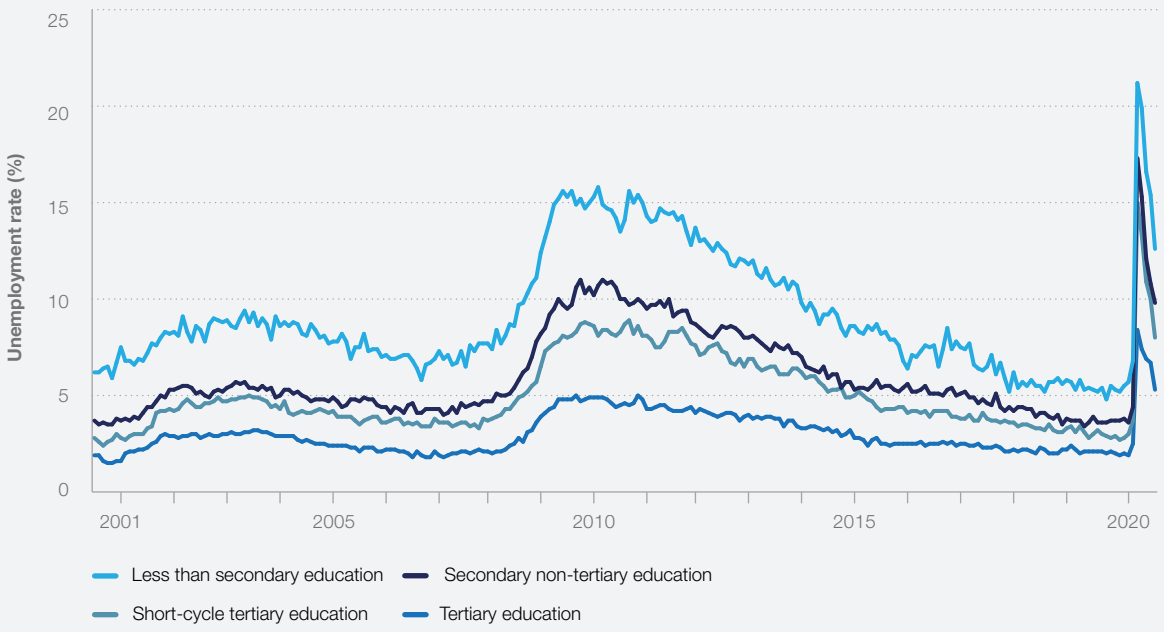



Source

ADP Research Institute, produced for the World Economic Forum's New Metrics CoLab.

FIGURE 14

**Unemployment rate in the United States by educational attainment, seasonally adjusted, 2000–2020**




Source

United States Bureau of Labor Statistics.

Note

Short-cycle tertiary education provides professional knowledge, skills and competencies. Typically, programmes are practically based and occupationally-specific.

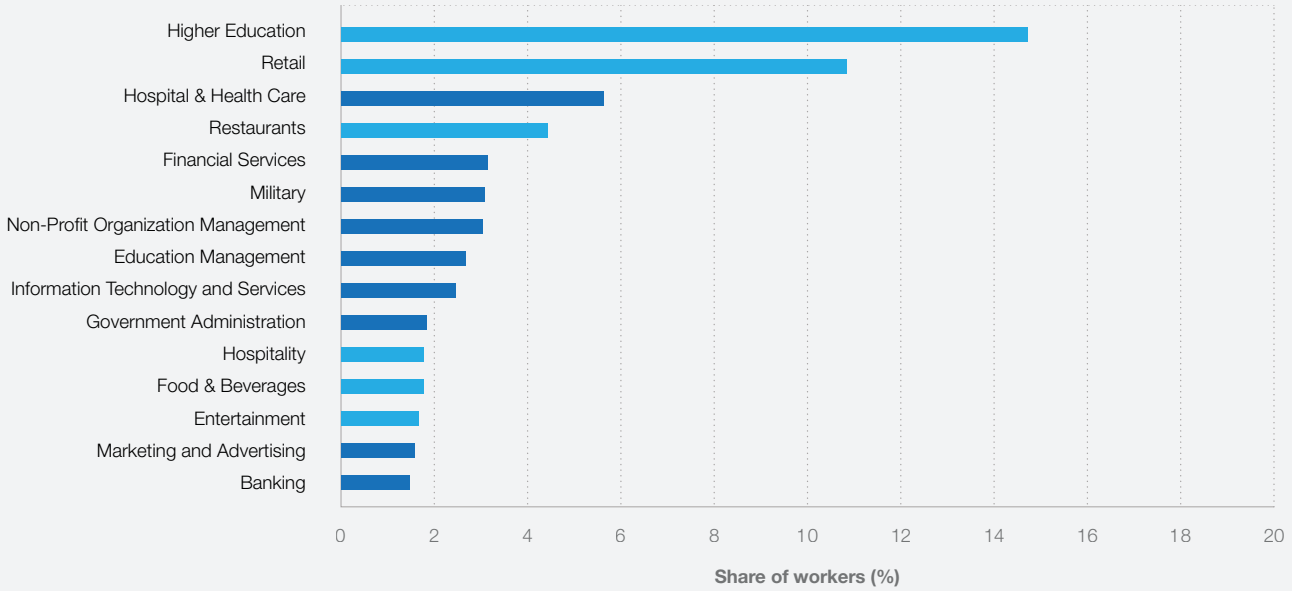
Finally, such turbulent labour markets provide additional challenges to young professionals navigating their entry into working life. The FutureFit AI global data map combines job automation and growth forecasts, real-time labour market information, learner resumes and the professional profiles of individuals. As such, it can track the historic job trajectories of professionals through different roles and industries,[30] and in this instance the transition of young professionals who are in their first decade of working life in the United States observed between 2008 and 2019.[31] The data in Figure 15 A reveals that, historically, the Retail, Restaurants, Hospitality, and the Food & Beverage sectors, as well some parts of Higher Education, have been among the top 20 starter-sectors for young people. However, as Figure 15 B indicates, these industries maintain a high attrition rate as workers tend to be transient. Thirty-seven percent of young professionals who work in Retail use the industry as a stepping-stone to another career and have historically moved onto another industry beyond the six affected sectors. The same figure is at 32% for those in the Restaurant sector. As roles in these sectors are temporarily or permanently displaced, those at the start of their careers will need to re-route and leapfrog into aspirational opportunities to work in high quality, well-remunerated jobs.

Figure 16 presents FutureFit AI data that documents past labour market transitions of young professionals over a decade. It shows the kinds of industries young professionals have targeted for their job transitions after entering the world of work in one of the six industries most affected by the COVID-19 pandemic. Figure 17 illustrates those next-step possible opportunities, which include new roles in the Healthcare, Financial Services, Not-for-Profit and Information, Technology and Services industries—roles such as Credit Analysts, Bank Tellers and Public Relations Coordinators in the Not-for-Profit sector, Certified Nursing Assistants in Healthcare, and Account Executives in the Information Technology and Services sector.

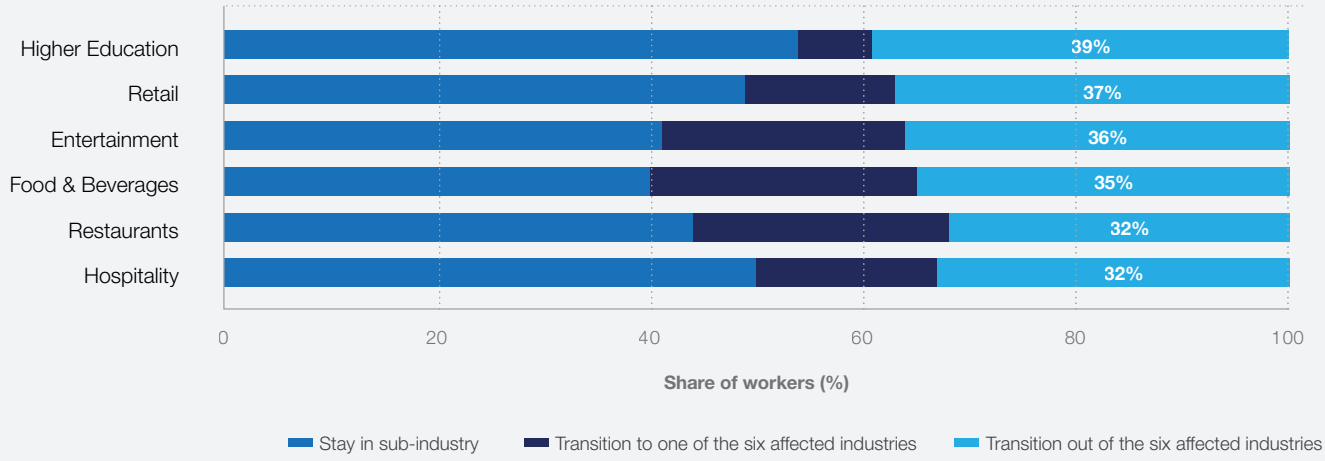
This willingness to transition to new job opportunities, matched with new reskilling and upskilling capabilities, can help place young professionals back on track, helping them find routes from affected to new, growing opportunities. While the data shared above suggests that businesses and individuals have taken on significant initiative to adapt to the current labour market, economic scarring and persistent damage to the labour market have the potential to limit the scale of opportunities available to workers. However, governments have at their disposal a range of tools that can alleviate the impact on workers as economies recover.

FIGURE 15 | Relationship between youth job transitions and affected industries

A. Youth first jobs, by sub-industry




B. Youth transcience through affected sub-industries




Source

FutureFit AI, produced for the World Economic Forum's New Metrics CoLab.

In previous recessions, the long-term impact on earnings among young people resulted in persistent earnings declines lasting up to 10 years, as young professionals started to work for lower-paying employers, then partly recover through a gradual process of mobility toward better firms. We have also seen young professionals start to work in occupations that do not match their education levels.[32] As we consider the ways to revive the labour market, such insights can point to ways in which data-driven re-employment can support not only re-entry into one's original industry or to an adjacent one, but also provide accelerated transitions to the ultimate career designation aspired to by young professionals.

The early indicators shared in this section signal that without adequate intervention, gains towards bridging societal inequalities might be reversed and wages further polarized. While data for the United States cannot be generalized to the world, the availability of such granular insights in this one economy serves as a stark reminder of the potential impact of these disruptions on equality within and across all economies.

FIGURE 16 | Primary possible transitions for affected young professionals

| Source sub-industry | Destination sub-industry | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | Apparel & Fashion | Broadcast Media | Education Management | Financial Services | Hospital & Health Care | Non-Profit Organization Management | Information Technology and Services | Marketing and Advertising | Real Estate |
| Entertainment | - | 4% | - | 4% | 5% | 4% | - | 5% | - |
| Food & Beverages | - | - | 4% | 5% | 6% | 5% | 3% | - | - |
| Higher Education | - | - | 4% | 4% | 9% | 6% | 4% | - | - |
| Hospitality | - | - | - | 7% | 7% | 5% | - | 4% | 4% |
| Restaurants | - | - | 3% | 5% | 8% | 6% | 3% | - | - |
| Retail | 5% | - | 4% | 6% | 8% | 4% | - | - | - |

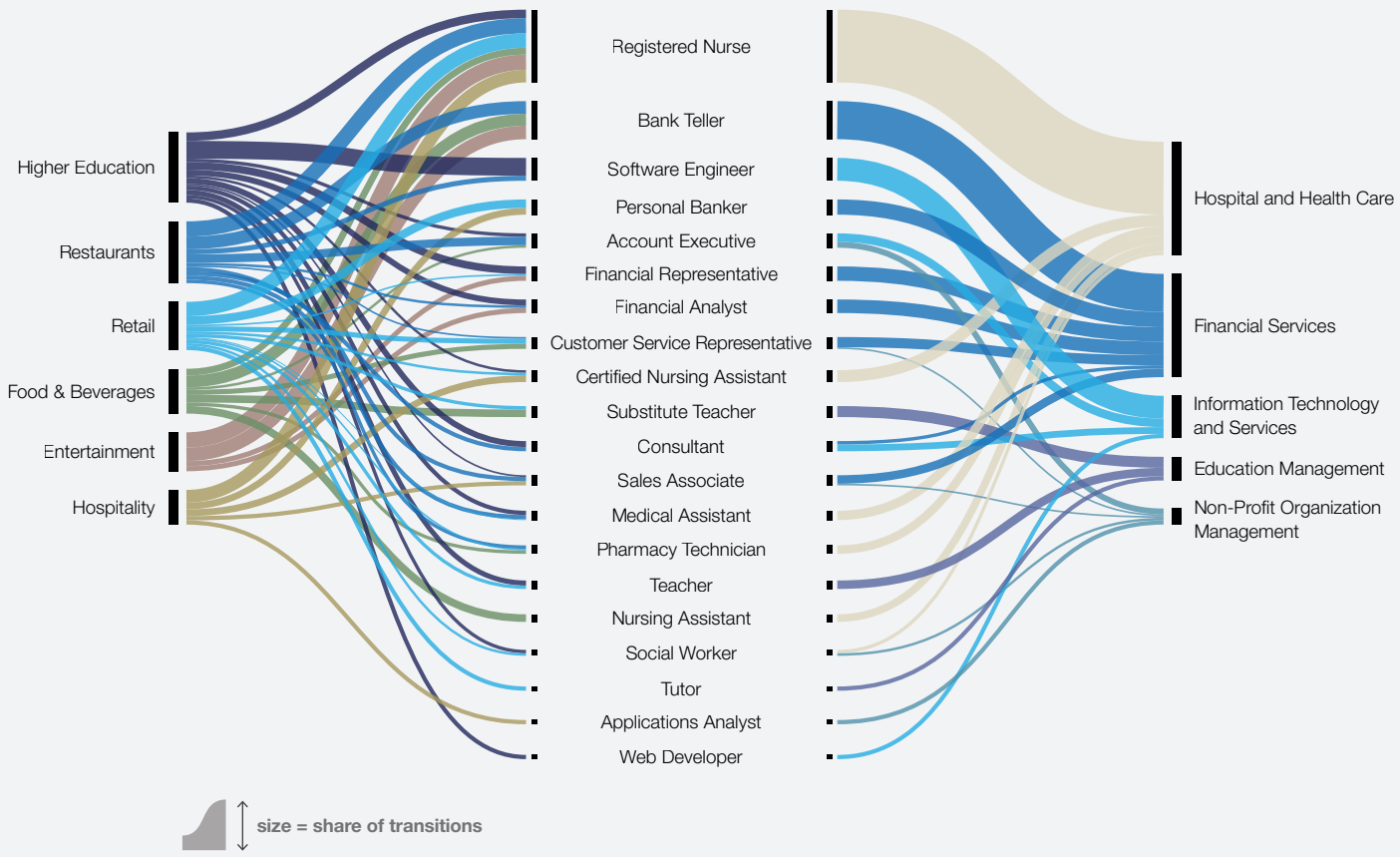
Source

FutureFit AI, produced for the World Economic Forum's New Metrics CoLab.

Note

Values refer to share of workers transitioning from source sub-industry to destination sub-industry.

FIGURE 17 | In-focus transitions for affected young workers




Source

FutureFit AI, produced for the World Economic Forum's New Metrics CoLab.

2

# Forecasts for Labour Market Evolution in 2020-2025

Over the past five years, the World Economic Forum has tracked the arrival of the future of work, identifying the potential scale of worker displacement due to technological automation and augmentation alongside effective strategies for empowering job transitions from declining to emerging jobs. At the core of the report and its analysis is the Future of Jobs survey, a unique tool which assess the short- and long-term trends and impact of technological adoption on labour markets. The data outlined in the following chapter tracks technological adoption among firms alongside changing job requirements and skills demand. These qualitative survey responses are further complemented by granular data from new sources derived from privately-held data that tracks key jobs and skills trends. Together, these two types of sources provide a comprehensive overview of the unfolding labour market trends as well as an opportunity to plan and strategize towards a better future of work.

## 2.1 Technological adoption

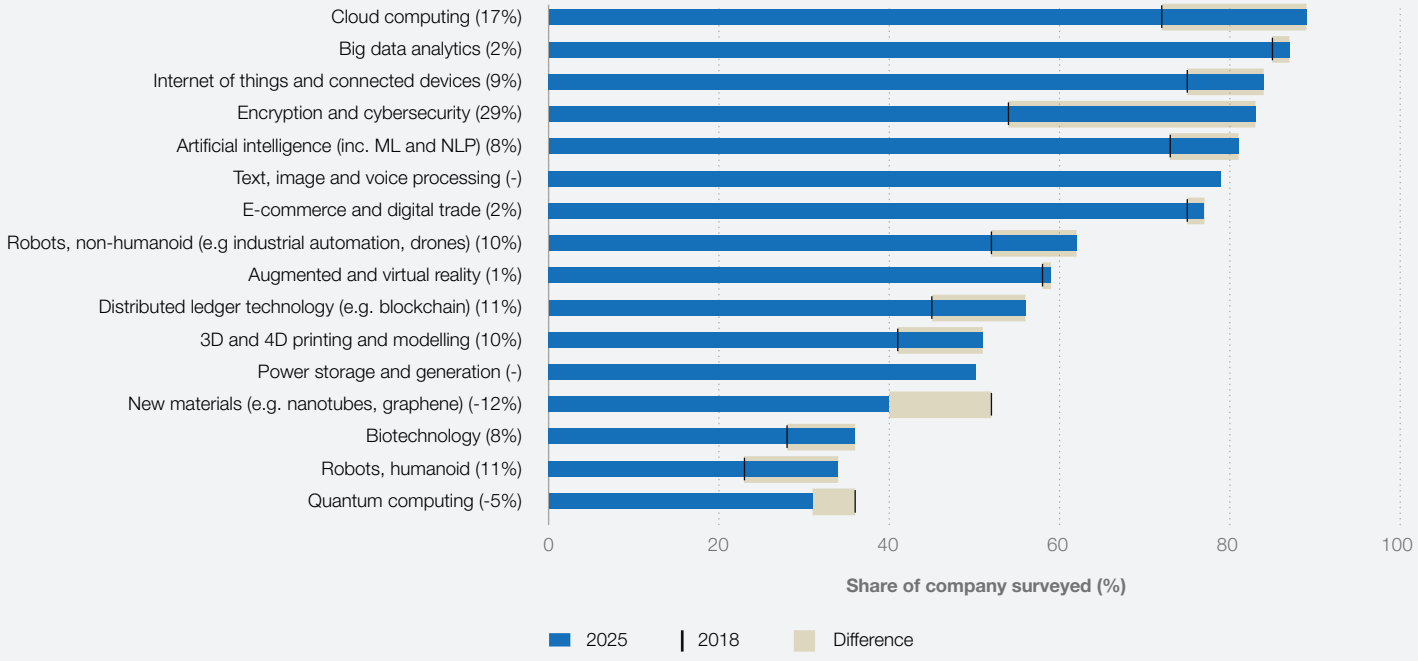
The past two years have seen a clear acceleration in the adoption of new technologies among the companies surveyed. Figure 18 presents a selection of technologies organized according to companies' likelihood to adopt them by 2025. Cloud computing, big data and e-commerce remain high priorities, following a trend established in previous years. However, there has also been a significant rise in interest in encryption, reflecting the new vulnerabilities of our digital age, and a significant increase in the number of firms expecting to adopt non-humanoid robots and artificial intelligence, with both technologies slowly becoming a mainstay of work across industries.

These patterns of technological adoption vary according to industry. As demonstrated in Figure 19, Artificial intelligence is finding the most broad adaptation among the Digital Information and Communications, Financial Services, Healthcare, and Transportation industries. Big data, the Internet of Things and Non-Humanoid Robotics are seeing strong adoption in Mining and Metals, while the Government and the Public Sector industry shows a distinctive focus on encryption.

These new technologies are set to drive future growth across industries, as well as to increase the demand for new job roles and skill sets. Such positive effects may be counter-balanced by workforce disruptions. A substantial amount of literature has indicated that technological adoption will impact workers' jobs by displacing some tasks performed by humans into the realm of work performed by machines. The extent of disruption will vary depending on a worker's occupation and skill set.[33]

Data from the Forum's Future of Jobs Survey shows that companies expect to re-structure their workforce in response to new technologies (Figure 20). In particular, the companies surveyed indicate that they are also looking to transform the composition of their value chain (55%), introduce further automation, reduce the current workforce (43%) or expand their workforce as a result of deeper technological integration (34%), and expand their use of contractors for task-specialized work (41%).

FIGURE 18 **Technologies likely to be adopted by 2025 (by share of companies surveyed)**




Source

Future of Jobs Survey 2020, World Economic Forum.

The reallocation of current tasks between human and machine is already in motion. Figure 21 presents the share of current tasks at work performed by human vs. machine in 2020 and forecasted for 2025 according to the estimates and planning of senior executives today. One of the central findings of the *Future of Jobs 2018 Report* continues to hold—by 2025 the average estimated time spent by humans and machines at work will be at parity based on today's tasks. Algorithms and machines will be primarily focused on the tasks of information and data processing and retrieval, administrative tasks and some aspects of traditional manual labour. The tasks where humans are expected to retain their comparative advantage include managing, advising, decision-making, reasoning, communicating and interacting.

FIGURE 19 **Technologies likely to be adopted by 2025, by share of companies surveyed, selected sectors**

| Technology/Sector | AGRI (%) | AUTO (%) | CON (%) | DIGICIT (%) | EDU (%) | ENG (%) | FS (%) | GOV (%) | HE (%) | MANF (%) | MIM (%) | OILG (%) | PS (%) | TRANS (%) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 3D and 4D printing and modelling | 54 | 67 | 39 | 39 | 69 | 69 | 27 | 45 | 65 | 69 | 48 | 79 | 40 | 60 |
| Artificial intelligence (e.g. machine learning, neural networks, NLP) | 62 | 76 | 73 | 95 | 76 | 81 | 90 | 65 | 89 | 71 | 76 | 71 | 76 | 88 |
| Augmented and virtual reality | 17 | 53 | 58 | 73 | 70 | 75 | 62 | 56 | 67 | 54 | 57 | 71 | 57 | 62 |
| Big data analytics | 86 | 88 | 91 | 95 | 95 | 76 | 91 | 85 | 89 | 81 | 90 | 86 | 86 | 94 |
| Biotechnology | 50 | 18 | 48 | 40 | 46 | 47 | 46 | 38 | 65 | 31 | 16 | 36 | 28 | 23 |
| Cloud computing | 75 | 80 | 82 | 95 | 95 | 88 | 98 | 95 | 84 | 92 | 87 | 86 | 88 | 94 |
| Distributed ledger technology (e.g. blockchain) | 31 | 40 | 41 | 72 | 61 | 50 | 73 | 40 | 72 | 41 | 50 | 46 | 53 | 38 |
| E-commerce and digital trade | 80 | 75 | 85 | 82 | 72 | 71 | 90 | 67 | 78 | 82 | 62 | 62 | 70 | 87 |
| Encryption and cyber security | 47 | 88 | 85 | 95 | 86 | 88 | 95 | 95 | 84 | 72 | 83 | 71 | 78 | 75 |
| Internet of things and connected devices | 88 | 82 | 94 | 92 | 62 | 94 | 88 | 79 | 95 | 84 | 90 | 93 | 74 | 76 |
| New materials (e.g. nanotubes, graphene) | 15 | 46 | 22 | 36 | 67 | 65 | 36 | 33 | 47 | 51 | 37 | 36 | 27 | 27 |
| Power storage and generation | 75 | 64 | 59 | 38 | 27 | 88 | 55 | 33 | 31 | 62 | 57 | 69 | 45 | 46 |
| Quantum computing | 18 | 21 | 17 | 51 | 25 | 41 | 44 | 36 | 38 | 21 | 29 | 25 | 19 | 38 |
| Robots, humanoid | 42 | 50 | 38 | 44 | 47 | 24 | 47 | 31 | 47 | 41 | 15 | 17 | 25 | 21 |
| Robots, non-humanoid (industrial automation, drones, etc.) | 54 | 60 | 52 | 61 | 59 | 65 | 53 | 50 | 56 | 79 | 90 | 79 | 35 | 69 |
| Text, image and voice processing | 50 | 59 | 82 | 90 | 89 | 88 | 88 | 89 | 88 | 64 | 76 | 87 | 79 | 65 |

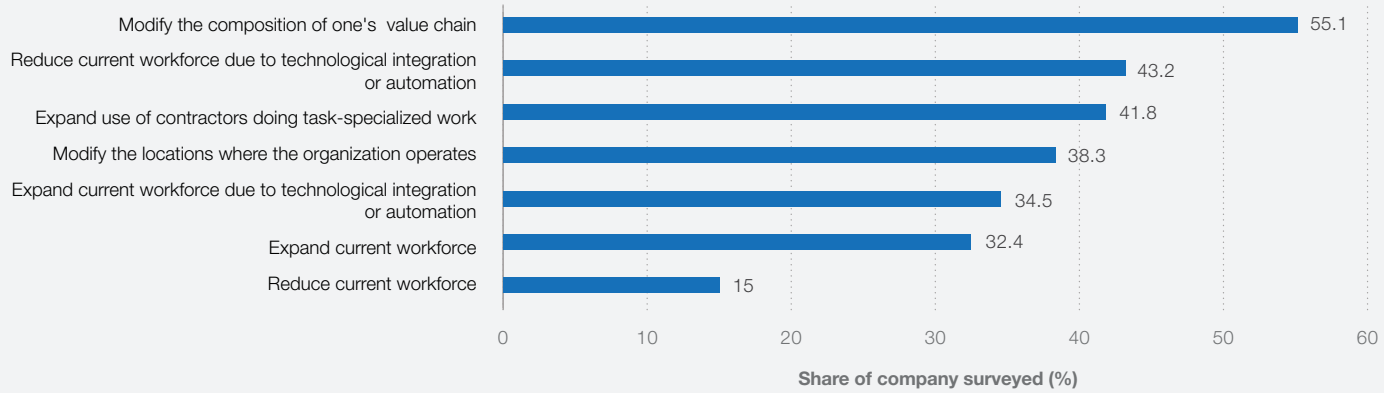
Source

Future of Jobs Survey 2020, World Economic Forum.

Note

AGRI = Agriculture, Food and Beverage; AUTO = Automotive; CON = Consumer; DIGICIT = Digital Communications and Information Technology; EDU = Education; ENG = Energy Utilities & Technologies; FS = Financial Services; GOV = Government and Public Sector; HE = Health and Healthcare; MANF = Manufacturing; MIM = Mining and Metals; OILG = Oil and Gas; PS = Professional Services; TRANS = Transportation and Storage.

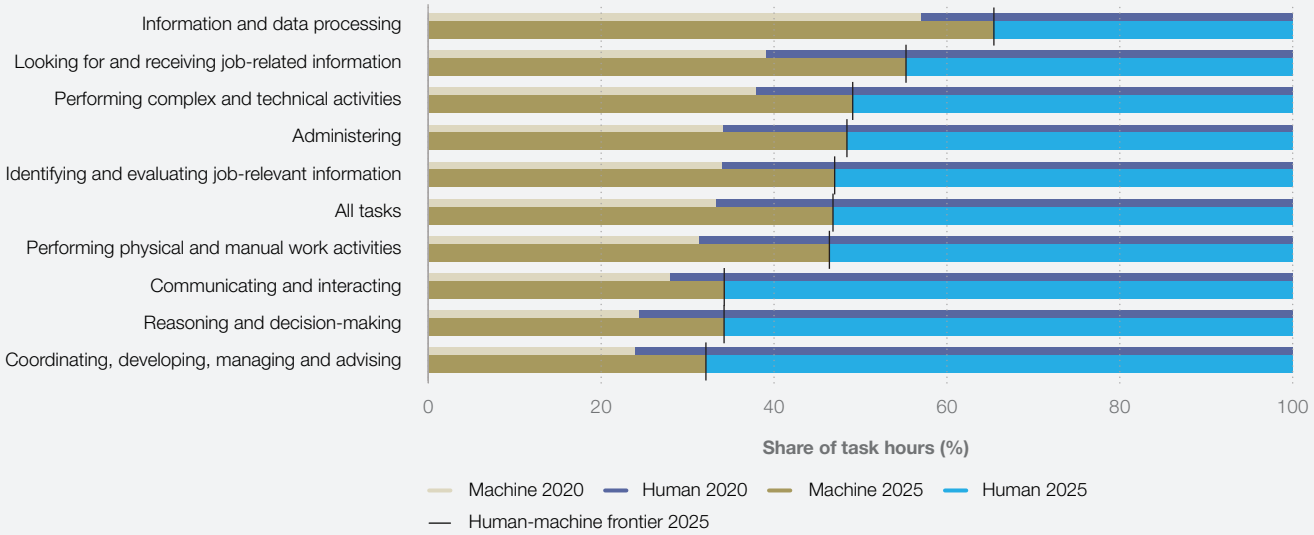
FIGURE 20 | **Companies' expected changes to the workforce by 2025 (by share of companies surveyed)**




Source

Future of Jobs Survey 2020, World Economic Forum.

FIGURE 21 | **Share of tasks performed by humans vs machines, 2020 and 2025 (expected), by share of companies surveyed**




Source

Future of Jobs Survey 2020, World Economic Forum.

## 2.2 Emerging and declining jobs

Extrapolating from the figures shared in the Future of Jobs Survey 2020, employers expect that by 2025, increasingly redundant roles will decline from being 15.4% of the workforce to 9% (6.4% decline), and that emerging professions will grow from 7.8% to 13.5% (5.7% growth) of the total employee base of company respondents. Based on these figures, we estimate that by 2025, 85 million jobs may be displaced by a shift in the division of labour between humans and machines, while 97 million new roles may emerge that are more adapted to the new division of labour between humans, machines and algorithms, across the 15 industries and 26 economies covered by the report.

The 2020 version of the Future of Jobs Survey also reveals similarities across industries when looking at increasingly strategic and increasingly redundant job roles. Similar to the 2018 survey, the leading positions in growing demand are roles such as Data Analysts and Scientists, AI and Machine Learning Specialists, Robotics Engineers,

Software and Application developers as well as Digital Transformation Specialists. However, job roles such as Process Automation Specialists, Information Security Analysts and Internet of Things Specialists are newly emerging among a cohort of roles which are seeing growing demand from employers. The emergence of these roles reflects the acceleration of automation as well as the resurgence of cybersecurity risks.

In addition, as presented in the Industry Profiles in Part 2 of this report, a set of roles are distinctively emerging within specific industries. This includes Materials Engineers in the Automotive Sector, Ecommerce and Social Media Specialists in the Consumer sector, Renewable Energy Engineers in the Energy Sector, FinTech Engineers in Financial Services, Biologists and Geneticists in Health and Healthcare as well as Remote Sensing Scientists and Technicians in Mining and Metals. The nature of these roles reflects the trajectory towards areas of innovation and growth across multiple industries.

At the opposite end of the scale, the roles which are set to be increasingly redundant by 2025 remain largely consistent with the job roles identified in 2018 and across a range of research papers on the automation of jobs.[34] These include roles which are being displaced by new technologies: Data Entry Clerks, Administrative and Executive Secretaries, Accounting and Bookkeeping and Payroll Clerks, Accountant and Auditors, Assembly and Factory Workers, as well as Business Services and Administrative Managers.

Such job disruption is counter-balanced by job creation in new fields, the 'jobs of tomorrow'. Over the coming decade, a non-negligible share of newly created jobs will be in wholly new occupations, or existing occupations undergoing significant transformations in terms of their content and skills requirements. The World Economic Forum's *Jobs of Tomorrow* report, authored in partnership with data scientists at partner companies LinkedIn and Coursera, presented for the first time a way to measure and track the emergence of a set of new jobs across the economy using real-time labour market data.[35] The data from this collaboration identified 99 jobs that are consistently growing in demand across 20 economies. Those jobs were then organized into distinct professional clusters according to their skills similarity.

This resulting set of emerging professions reflects the adoption of new technologies and increasing demand for new products and services, which are driving greater demand for green economy jobs, roles at the forefront of the data and AI economy, as well as new roles in engineering, cloud computing and product development. In addition, the emerging

FIGURE 22

**Top 20 job roles in increasing and decreasing demand across industries**

↗ **Increasing demand**

| | |
|---|---|
| 1 | Data Analysts and Scientists |
| 2 | AI and Machine Learning Specialists |
| 3 | Big Data Specialists |
| 4 | Digital Marketing and Strategy Specialists |
| 5 | Process Automation Specialists |
| 6 | Business Development Professionals |
| 7 | Digital Transformation Specialists |
| 8 | Information Security Analysts |
| 9 | Software and Applications Developers |
| 10 | Internet of Things Specialists |
| 11 | Project Managers |
| 12 | Business Services and Administration Managers |
| 13 | Database and Network Professionals |
| 14 | Robotics Engineers |
| 15 | Strategic Advisors |
| 16 | Management and Organization Analysts |
| 17 | FinTech Engineers |
| 18 | Mechanics and Machinery Repairers |
| 19 | Organizational Development Specialists |
| 20 | Risk Management Specialists |

↘ **Decreasing demand**

| | |
|---|---|
| 1 | Data Entry Clerks |
| 2 | Administrative and Executive Secretaries |
| 3 | Accounting, Bookkeeping and Payroll Clerks |
| 4 | Accountants and Auditors |
| 5 | Assembly and Factory Workers |
| 6 | Business Services and Administration Managers |
| 7 | Client Information and Customer Service Workers |
| 8 | General and Operations Managers |
| 9 | Mechanics and Machinery Repairers |
| 10 | Material-Recording and Stock-Keeping Clerks |
| 11 | Financial Analysts |
| 12 | Postal Service Clerks |
| 13 | Sales Rep., Wholesale and Manuf., Tech. and Sci.Products |
| 14 | Relationship Managers |
| 15 | Bank Tellers and Related Clerks |
| 16 | Door-To-Door Sales, News and Street Vendors |
| 17 | Electronics and Telecoms Installers and Repairers |
| 18 | Human Resources Specialists |
| 19 | Training and Development Specialists |
| 20 | Construction Laborers |

Source

Future of Jobs Survey 2020, World Economic Forum.

professions showcase the continuing importance of human interaction in the new economy through roles in the care economy; in marketing, sales and content production; as well as roles where a facility or aptitude for understanding and being comfortable working with different types of people from different backgrounds is critical. Figure 23 displays the set of roles which correspond to each professional cluster, organized according to the scale of each opportunity.[36] Due to constraints related to data availability, the Care and Green Jobs cluster are not currently covered by the following analysis.

In this report we present a unique extension of this analysis which examines key learnings gleaned from job transitions into those emerging clusters using LinkedIn data gathered over the past five years. For this analysis the LinkedIn data science team analysed the job transitions of professionals who moved into emerging jobs over the period of 2015 to 2020. The researchers analysed when professionals transitioned into *any* new role as well as when they transitioned to a wholly new occupation—here called 'pivots'. To understand the skill profile of each occupation, analysts first identified a list of the most representative skills associated with an occupation, based on LinkedIn's Skills Genome Metric which calculates the 'most representative' skills across roles, using the TF-IDF method. To examine the extent to which certain skills groups of interest are associated with a particular occupation, a 'skill penetration' figure is calculated. This indicates the share of individual skills associated with that occupation that belong to a given skill group. To understand the skill profile of each occupation, analysts calculated the 'skill penetration' score for each skill associated with an occupation. That is, the 'skill penetration' figure indicates the individuals from that occupation who list the specific skill as a share of all individuals employed in that occupation.

The aggregate skills similarity between two occupations is then calculated as the cosine similarity of those two occupations. In addition, for each skill group, a skills gap measure is calculated by expressing the skill penetration of the destination job as a share of the same indicator in the source job.

The evidence indicates that some emerging job clusters present significant opportunities for transitions into growing jobs (jobs in increasing demand) through effective career pivots. As demonstrated in Figure24 A, among the transitions into Data and AI professions, 50% of the shifts made are from non-emerging roles. That figure is much higher at 75% in Sales, 72% in content roles and 67% of Engineering roles. One could say that such field are easier to break into, while those such as Data and AI and People and Culture present more challenges. These figures suggest that some level of labour force reallocation is already underway.

By analysing these career pivots—instances where professionals transition to wholly new occupations—it becomes apparent that some of these so-called 'jobs of tomorrow' present greater opportunities for workers looking to fully switch their job family and therefore present more options to reimagine one's professional trajectory, while other emerging professions remain more fully bounded. As presented in Figure 24 C only 19% and 26% of job transitions into Engineering and People and Culture, respectively, come from outside the job family in which those roles are today. In contrast, 72% of Data and AI bound transitions originate from a different job family and 68% of transitions into emerging jobs within Sales. As illustrated in Figure 25 emerging job clusters are typically staffed by workers starting in a set of distinctive job families, but the diversity of those source job families varies by emerging profession. While emerging roles in Product Development draw professionals from a range of job families, emerging roles in People and Culture job cluster typically transition from the Human Resources job family. The emerging Cloud Computing job cluster is primarily populated by professionals transitioning from IT and Engineering.

Finally, a number of jobs of tomorrow present greater opportunities to pivot into professions with a significant change in skills profile. In Figure24 B it is possible to observe that transitions into People and Culture and into Engineering have typically been ones with high skills similarity while Marketing and Content Development have been more permissive of low skills similarity. Among the emerging professions outlined in this report, transitions into Data and AI allow for the largest variation in skills profile between source and destination job title.

Figure 25 demonstrates that the newer emerging professions such as Data and AI, Product Development and Cloud Computing present more opportunities to break into these frontier fields, and that, in fact, such transitions do not require a full skills match between the source and destination occupation. However, some job clusters of tomorrow remain more 'closed' and tend to recruit staff with a very specific skill set. It is not possible to observe whether those limitations are necessary or simply established practice. It may be the case that such 'siloed' professional clusters can be reinvigorated by experimentation with relaxing the constraints for entry into some emerging jobs alongside appropriate reskilling and upskilling.

FIGURE 23 | Emerging roles clustered into the jobs of tomorrow

## Care Economy

### Cloud Computing

1. Site Reliability Engineer
2. Platform Engineer
3. Cloud Engineer
3. DevOps Engineer
5. Cloud Consultant
6. DevOps Manager

### Content Production

1. Social Media Assistant
2. Social Media Coordinator
3. Content Specialist
4. Content Producer
5. Content Writer
6. Creative Copywriter

### Data and AI

1. Artificial Intelligence Specialist
2. Data Scientist
3. Data Engineer
4. Big Data Developer
5. Data Analyst
6. Analytics Specialist
7. Data Consultant
8. Insights Analyst
9. Business Intelligence Developer
10. Analytics Consultant

### Engineering

1. Python Developer
2. Full Stack Engineer
2. Javascript Developer
4. Back End Developer
5. Frontend Engineer
5. Software Developer Dotnet
7. Development Specialist
8. Technology Analyst

## Green Economy

### Marketing

1. Growth Hacker
2. Growth Manager
3. Digital Marketing Specialist
4. Digital Specialist
5. Ecommerce Specialist
6. Commerce Manager
6. Head Of Digital
8. Digital Marketing Consultant
9. Digital Marketing Manager
10. Chief Marketing Officer

### People and Culture

1. Information Technology Recruiter
2. Human Resources Partner
3. Talent Acquisition Specialist
4. Business Partner
5. Human Resources Business Partner

### Product Development

1. Product Owner
2. Quality Assurance Tester
3. Agile Coach
4. Software Quality Assurance Engineer
5. Product Analyst
6. Quality Assurance Engineer
6. Scrum Master
8. Digital Product Manager
9. Delivery Lead

### Sales

1. Customer Success Specialist
2. Sales Development Representative
3. Commercial Sales Representative
4. Business Development Representative
5. Customer Specialist
6. Partnerships Specialist
7. Chief Commercial Officer
8. Head Of Partnerships
9. Enterprise Account Executive
10. Business Development Specialist
11. Chief Strategy Officer
12. Head Of Business Development

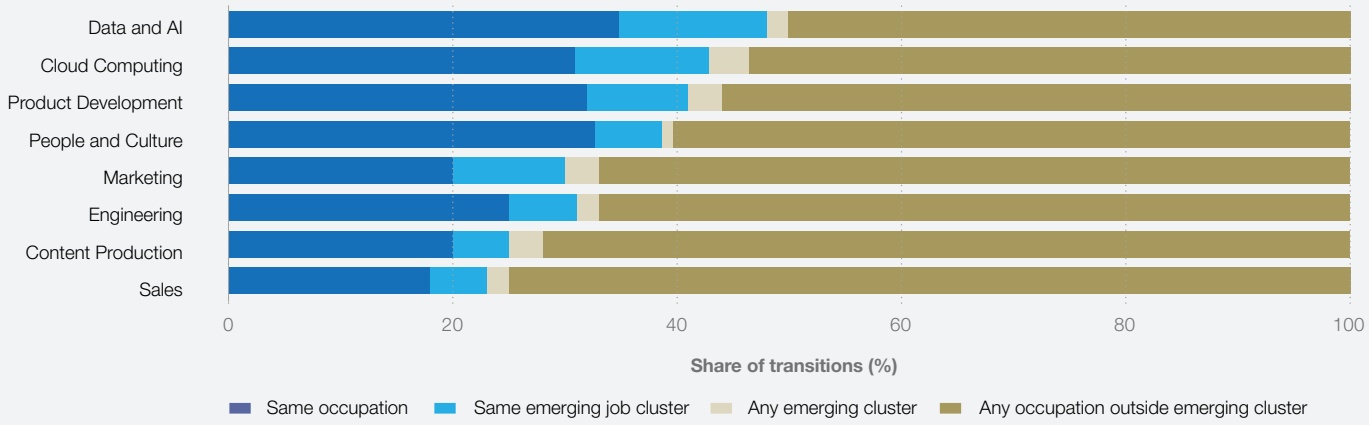
# Rank  Niche  Mass

Source

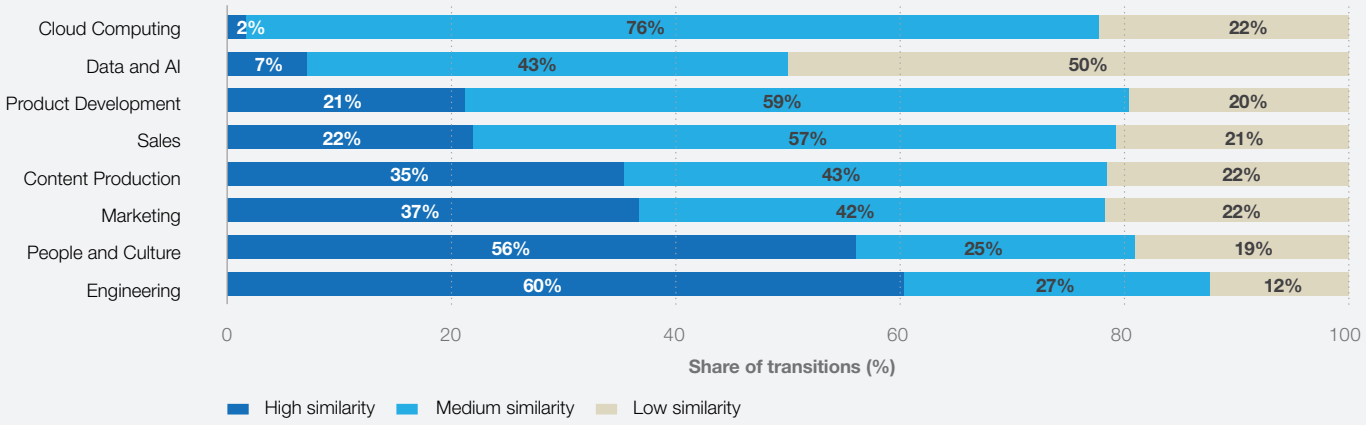
LinkedIn Economic Graph.

FIGURE 24 | Transitions and pivots into the jobs of tomorrow, selected countries

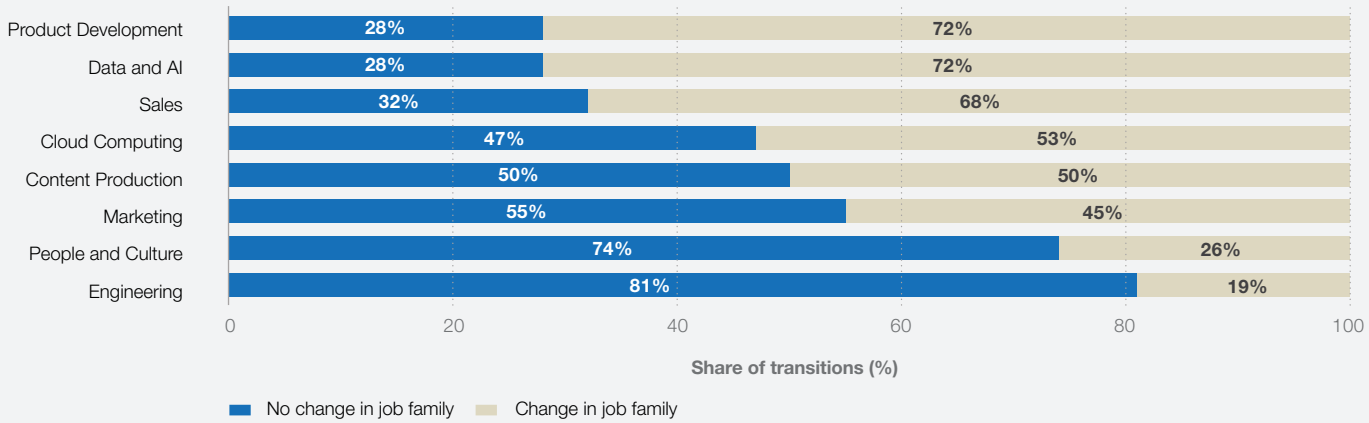
### A. Transition by occupation and job cluster of source occupation




### B. Job pivots by skills similarity with source occupation




### C. Job pivots by job family of source occupation




Source

LinkedIn Economic Graph.

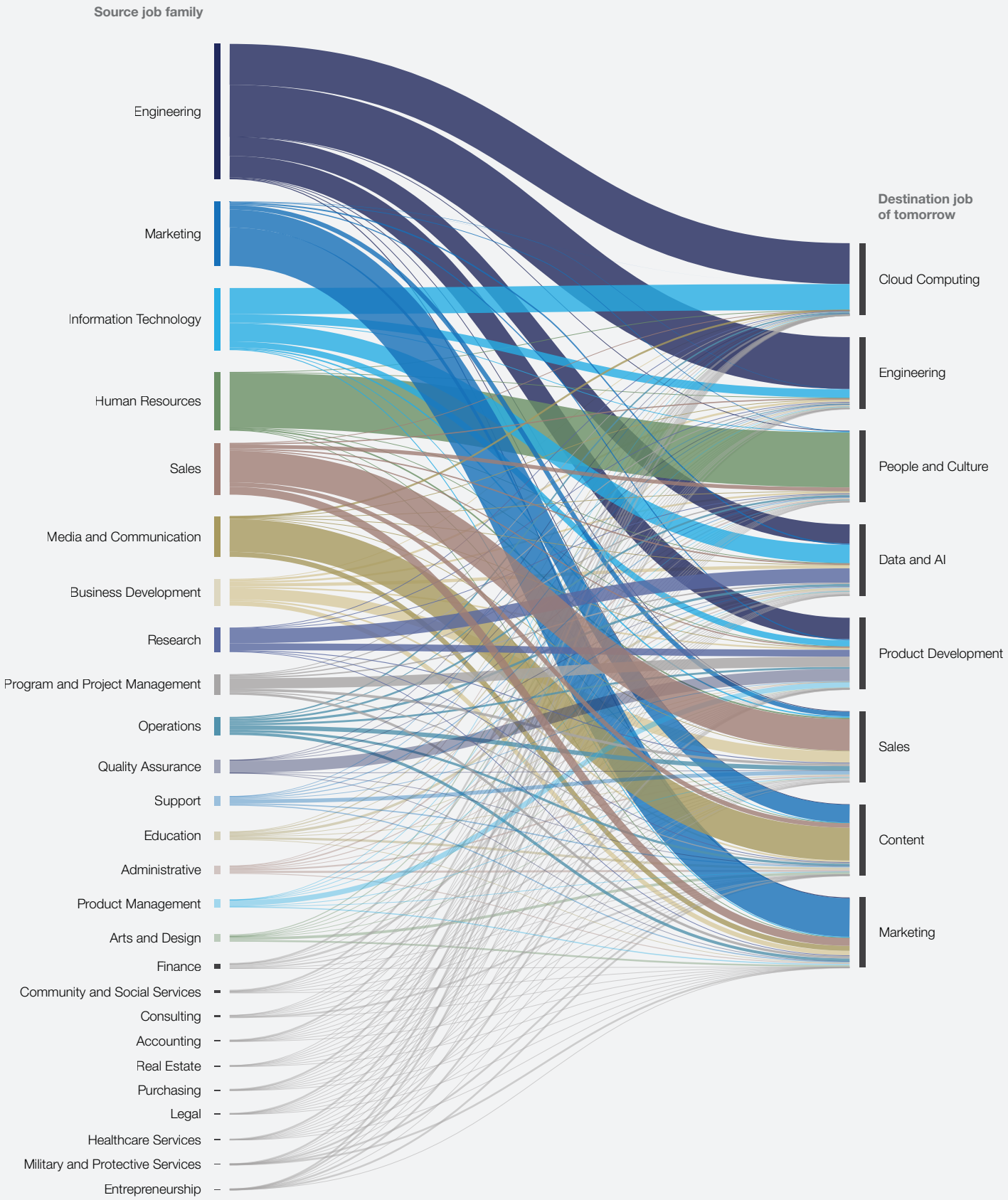
Note

Job transitions refers to any job transition while job pivots refers to individuals moving away from their current occupation. Job Families are groups of occupations based upon work performed, skills, education, training, and credentials.

Data derived from the following countries

Argentina, Australia, Brazil, Canada, France, Germany, India, Ireland, Italy, Mexico, Netherlands, New Zealand, Saudi Arabia, Singapore, South Africa, Spain, Sweden, United Arab Emirates, United Kingdom and United States.

FIGURE 25 | Transitions into the jobs of the future




Source

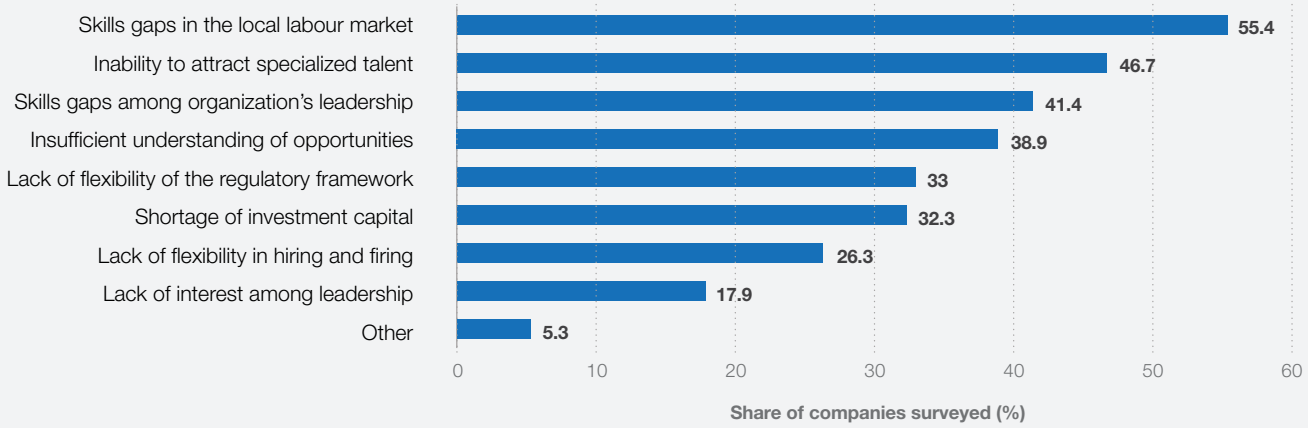
LinkedIn Economic Graph.

# 2.3 Emerging and declining skills

The ability of global companies to harness the growth potential of new technological adoption is hindered by skills shortages. Figure 26 shows that skills gaps in the local labour market and inability to attract the right talent remain among the leading barriers to the adoption of new technologies. This finding is consistent across 20 of the 26 countries covered by the Country Profiles presented in Part 2 of the report. In the absence of ready talent, employers surveyed through the Future of Jobs Survey report that, on average, they provide access to reskilling and upskilling to 62% of their workforce, and that by 2025 they will expand that provision to a further 11% of their workforce. However, employee engagement into those courses is lagging, with only 42% of employees taking up employer-supported reskilling and upskilling opportunities.

Skill shortages are more acute in emerging professions. Asked to rate the ease of finding skilled employees across a range of new, strategic roles, business leaders consistently cite difficulties when hiring for Data Analysts and Scientists, AI and Machine Learning Specialists as well as Software and Application Developers, among other emerging roles. While an exact skills match is not a prerequisite to making a job transition, the long-term productivity of employees is determined by their mastery of key competencies. This section of the report takes stock of the types of skills that are currently in demand as well as the efforts underway to fill that demand through appropriate reskilling and upskilling.

FIGURE 26 **Perceived barriers to the adoption of new technologies**




Source

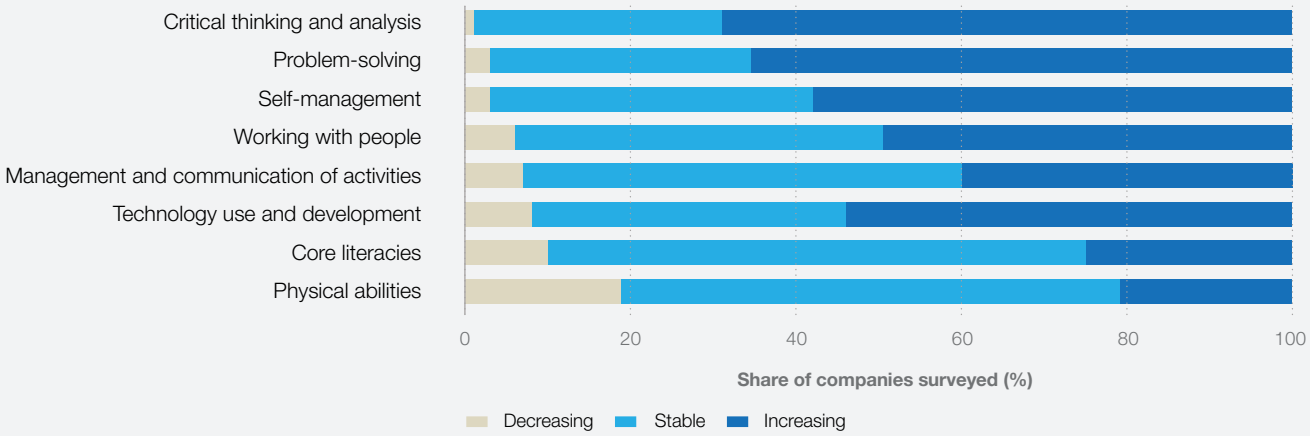
Future of Jobs Survey 2020, World Economic Forum.

Since its 2016 edition, this report has tracked the cross-functional skills which are in increasing demand. Figure 27 shows the top skills and skill groups which employers see as rising in prominence in the lead up to 2025. These include groups such as critical thinking and analysis as well as problem-solving, which have stayed at the top of the agenda with year-on-year consistency. Newly emerging this year are skills in self-management such as active learning, resilience, stress tolerance and flexibility. In addition, the data available through metrics partnerships with LinkedIn and Coursera allow us to track with unprecedented granularity the types of specialized skills needed for the jobs of tomorrow. Figure 28 demonstrates the set of skills which are in demand across multiple emerging professions. Among these 'cross-cutting' skills are specialized skills in Product Marketing, Digital Marketing and Human Computer Interaction.

This report reveals in further granular detail the types of insights that can guide job transitions through to appropriate reskilling and upskilling. Figures 29 and 30 demonstrate those metrics. Figure 29 presents the set of high-growth, emerging roles that are currently covered by the Data and AI job cluster, and the typical skills gap between source and destination professions when workers have moved into those roles over the past five years. Figure 30 presents the typical learning curriculum of Coursera learners who are targeting a transition into Data and AI and the distance from the optimal level of mastery in the relevant job cluster, and quantifies the days of learning needed for the average worker to gain that level of mastery. Figures 29 and 30 together demonstrate that it is common for individuals moving into Data and AI to lack key data science skills—but that individuals seeking to transition into such roles will be able to work towards the right skill set through mastery of skills such as statistical programming within a recommended time frame, in this case, 76 days of learning.

FIGURE 27 | **Perceived skills and skills groups with growing demand by 2025, by share of companies surveyed**

### A. Relative importance of different skill groups




### B. Top 15 skills for 2025

| | |
|---|---|
| 1 | Analytical thinking and innovation |
| 2 | Active learning and learning strategies |
| 3 | Complex problem-solving |
| 4 | Critical thinking and analysis |
| 5 | Creativity, originality and initiative |
| 6 | Leadership and social influence |
| 7 | Technology use, monitoring and control |
| 8 | Technology design and programming |
| 9 | Resilience, stress tolerance and flexibility |
| 10 | Reasoning, problem-solving and ideation |
| 11 | Emotional intelligence |
| 12 | Troubleshooting and user experience |
| 13 | Service orientation |
| 14 | Systems analysis and evaluation |
| 15 | Persuasion and negotiation |

Source

Future of Jobs Survey 2020, World Economic Forum.

In addition to skills that are directly jobs-relevant, during the COVID-19 context of 2020, data from the online learning provider Coursera has been able to identify an increasing emphasis within learner reskilling and upskilling efforts on personal development and self-management skills. This echoes earlier findings on the importance of well-being when managing in the remote and hybrid work: demand for new skills acquisition has bifurcated. Figure 31 A illustrates the changing demand for training by employment status, comparing the April-to-June period this year with the same period last year. This data reveals a significant increase in demand for personal development courses, as well as for courses in health, and a clear distinction between those who are currently in employment and those who are unemployed. Those in employment are placing larger emphasis on personal development courses, which have seen 88% growth among that population. Those who are unemployed have placed greater emphasis on learning digital skills such as data analysis, computer science and information technology. These trends can be observed in more granular detail in Figures 31 B and C. In particular, self-management skills such as mindfulness, meditation, gratitude and kindness are among the top 10 focus areas of those in employment in contrast to the more technical skills which were in-focus in 2019. In contrast, those who are unemployed have continued to emphasize skills which are of relevance to emerging jobs in Engineering, Cloud Computing, Data and AI.[37]

When it comes to employers providing workers with training opportunities for reskilling and upskilling, in contrast to previous years, employers are expecting to lean more fully on informal as opposed to formal learning. In the Future of Jobs Survey, 94% of business leaders report that they expect employees to pick up new skills on the job, a sharp uptake from 65% in 2018. An organization's learning curricula is expected to blend different approaches—drawing on internal and external expertise, on new education technology tools and using both formal and informal methods of skills acquisition.

## FIGURE 28 | Top cross-cutting, specialized skills of the future

| Specialized skill | Emerging job clusters |
|---|---|
| 1. Product Marketing | Data and AI, People and Culture, Marketing, Product Development, Sales (5) |
| 2. Digital Marketing | Content, Data and AI, Marketing, Product Development, Sales (5) |
| 3. Software Development Life Cycle (SDLC) | Cloud Computing, Data and AI, Engineering, Marketing, Product Development (5) |
| 4. Business Management | People and Culture, Marketing, Product Development, Sales (4) |
| 5. Advertising | Content, Data and AI, Marketing, Sales (4) |
| 6. Human Computer Interaction | Content, Engineering, Marketing, Product Development (4) |
| 7. Development Tools | Cloud Computing, Data and AI, Engineering, Product Development (4) |
| 8. Data Storage Technologies | Cloud Computing, Data and AI, Engineering, Product Development (4) |
| 9. Computer Networking | Cloud Computing, Data and AI, Engineering, Sales (4) |
| 10. Web Development | Cloud Computing, Content, Engineering, Marketing (4) |
| 11. Management Consulting | Data and AI, People and Culture, Product Development (3) |
| 12. Entrepreneurship | People and Culture, Marketing, Sales (3) |
| 13. Artificial Intelligence | Cloud Computing, Data and AI, Engineering (3) |
| 14. Data Science | Data and AI, Marketing, Product Development (3) |
| 15. Retail Sales | People and Culture, Marketing, Sales (3) |
| 16. Technical Support | Cloud Computing, Product Development, Sales (3) |
| 17. Social Media | Content, Marketing, Sales (3) |
| 18. Graphic Design | Content, Engineering, Marketing (3) |
| 19. Information Management | Content, Data and AI, Marketing (3) |

Source

LinkedIn Economic Graph.

Note

Cross-cutting skills are those skills that are applicable and easily transferable across many occupations and roles.

## FIGURE 29 | Data and AI jobs of tomorrow, top roles and typical skills in past transitions

### A. Opportunities within professional cluster

| Rank | Scale of opportunity | Job |
|---|---|---|
| 1 | Mass | Artificial Intelligence Specialist |
| 2 | Mass | Data Scientist |
| 3 | Mass | Data Engineer |
| 4 | Niche | Big Data Developer |
| 5 | Mass | Data Analyst |
| 6 | Mass | Analytics Specialist |
| 7 | Niche | Data Consultant |
| 8 | Niche | Insights Analyst |
| 9 | Niche | Business Intelligence Developer |
| 10 | Mass | Analytics Consultant |

Source

LinkedIn Economic Graph.

Note

The gap measure has been capped at 1.00.

### B. Typical skills gaps across successful job transitions

| Rank | Skill | Skill gap of workers transitioning into this job cluster (0 is full gap, 1 is no gap) |
|---|---|---|
| 1 | Data Science | 0.19 |
| 2 | Data Storage Technologies | 0.41 |
| 3 | Artificial Intelligence | 0.10 |
| 4 | Development Tools | 0.73 |
| 5 | Computer Networking | 0.78 |
| 6 | Management Consulting | 0.85 |
| 7 | Scientific Computing | 0.41 |
| 8 | Product Marketing | 1.00 |
| 9 | Natural Language Processing | 0.11 |
| 10 | Digital Marketing | 1.00 |
| 11 | Advertising | 1.00 |
| 12 | Cloud Computing | 0.27 |
| 13 | Customer Experience | 1.00 |
| 14 | Signal Processing | 0.15 |
| 15 | Information Management | 0.93 |
| 16 | Software Development Life Cycle (SDLC) | 1.00 |

FIGURE 30 | Data and AI jobs of tomorrow, typical learning agenda and time to achieve mastery in key skills

### A. Typical learning agenda

| Rank | Skill |
|---|---|
| 1 | Data Analysis |
| 2 | Computer Programming |
| 3 | General Statistics |
| 4 | Leadership And Management |
| 5 | Regression |
| 6 | Machine Learning |
| 7 | Big Data |
| 8 | Python Programming |

### B. Top 10 skills by required level of mastery and time to achieve that mastery

| Rank | Skill | Expected mastery score (0 to 6, best) | Typical mastery gap | Average days to master skill |
|---|---|---|---|---|
| 1 | Statistical Programming | 5.50 | 54% | 72 |
| 2 | Communication | 4.36 | 34% | 80 |
| 3 | Leadership and Management | 3.61 | 66% | 39 |
| 4 | Data Management | 3.61 | 45% | 84 |
| 5 | Marketing | 3.57 | 55% | 43 |
| 6 | Finance | 3.56 | 46% | 67 |
| 7 | Sales | 3.43 | 84% | 13 |
| 8 | Computer Programming | 3.43 | 41% | 76 |
| 9 | Business Analysis | 3.24 | 65% | 34 |
| 10 | Machine Learning | 3.06 | 54% | 86 |

Source

Coursera.

Note

Mastery score is the score attained by those in the top 80% on an assessment for that skill. Mastery gap is measured as a percentage representing the score among those looking to transition to the occupation as a share of the score among those already in the occupation.

According to data from the Future of Jobs Survey, formal upskilling appears to be more closely focused on technology use and design skills, while emotional intelligence skills are less frequently targeted in that formal reskilling provision. Data from Coursera showing the focus areas of workforce recovery programmes and employer-led reskilling and upskilling activities confirms that finding. In-focus courses are primarily those in technical skills alongside a cohort of managerial skills in strategy and leadership.

On average, respondents to the Future of Jobs Survey estimate that around 40% of workers will require reskilling of six months or less. That figure is higher for workers in the Consumer industry and in the Health and Healthcare industry, where employers are likely to expect to lean on short-cycle reskilling. The share of workers who can be reskilled within six months is lower in the Financial Services and the Energy sectors, where employers expect that workers will need more time-intensive reskilling. These patterns are explored more deeply in the Industry Profiles in Part 2.

According to Future of Jobs Survey data, employers expect to lean primarily on internal capacity to deliver training: 39% of training will be delivered by an internal department. However, that training will be supplemented by online learning platforms (16% of training) and by external consultants (11% of training). The trend towards the use of digital online reskilling has accelerated during the restrictions on in-person learning since the onset of the COVID-19 pandemic. New data from the online learning platform Coursera for April, May and June of 2020 (quarter 2) signals a substantial expansion in the use of online learning. In fact, there has been a four-fold increase in the numbers of individuals seeking out opportunities for learning online through their own initiative, a five-fold increase in employer provision of online learning opportunities to their workers and an even more extensive nine-fold enrolment increase for learners accessing online learning through government programmes.

Through focused efforts, individuals could acquire one of Coursera's top 10 mastery skills in emerging professions across People and Culture, Content Writing, Sales and Marketing in one to two months. Learners could expand their skills in Product Development and Data and AI in two to three months; and if they wish to fully re-pivot to Cloud and Engineering, learners could make headway into that key skill set through a 4-5 month learning programme.[38] Such figures suggest that although learning a new skill set is increasingly accessible through new digital technologies, to consolidate new learning individuals will need access to the time and funding to pursue such new career trajectories. LinkedIn data presented in section 2.2 indicates that although many individuals can move into emerging roles with low or mid skills similarity, a low-fit initial transition will still require eventual upskilling and reskilling to ensure long term productivity.

FIGURE 31

## Distribution of course enrolment and growth of interest, by course specialism, employment status and year

### A. Changes to in-focus course specialism by employment status

| | | Distribution of enrolled, April, May and June (Q2) | | | | | | Year-on-year change, Q2 2019 to 2020 | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Rank 2020 | Course Specialism | All 2019 | All 2020 | Employed 2019 | Employed 2020 | Unemployed 2019 | Unemployed 2020 | All | Employed | Unemployed |
| 1 | Business | 18% | 19% | 21% | 22% | 16% | 19% | 5% | 7% | 17% |
| 2 | Computer Science | 18% | 16% | 17% | 11% | 23% | 21% | -8% | -34% | -7% |
| 3 | Health | 9% | 13% | 8% | 14% | 6% | 8% | 48% | 81% | 44% |
| 4 | Data Science | 20% | 13% | 22% | 12% | 28% | 18% | -37% | -44% | -35% |
| 5 | Personal Development | 6% | 9% | 6% | 12% | 3% | 5% | 42% | 88% | 67% |
| 6 | Language Learning | 5% | 7% | 4% | 6% | 4% | 6% | 46% | 55% | 45% |
| 7 | Arts and Humanities | 6% | 7% | 5% | 7% | 4% | 5% | 12% | 32% | 4% |
| 8 | Physical Science and Engineering | 6% | 6% | 5% | 5% | 6% | 6% | 7% | 3% | 11% |
| 9 | Social Sciences | 6% | 5% | 5% | 5% | 4% | 3% | -27% | -4% | -17% |
| 10 | Information Technology | 4% | 4% | 5% | 4% | 5% | 7% | 1% | -23% | 49% |
| 11 | Math and Logic | 2% | 1% | 1% | 1% | 2% | 1% | -23% | -15% | -16% |

### B. Top 10 in-focus skills of those in employment

| Rank | 2019 | 2020 |
|---|---|---|
| 1 | Python Programming | ↑ Writing |
| 2 | Artificial Neural Networks | ↑ Strategy |
| 3 | Algorithms | ↓ Python Programming |
| 4 | Regression | ↑ Mindfulness |
| 5 | Strategy | ↑ Meditation |
| 6 | Deep Learning | ↑ Gratitude |
| 7 | Writing | ↑ Kindness |
| 8 | Supply Chain | ↑ Listening |
| 9 | Cloud Computing | ↓ Algorithms |
| 10 | General Statistics | ↑ Grammar |

### C. Top 10 skills for those who are unemployed

| Rank | 2019 | 2020 |
|---|---|---|
| 1 | Python Programming | – Python Programming |
| 2 | Artificial Neural Networks | ↑ Algorithms |
| 3 | Algorithms | ↑ Writing |
| 4 | Regression | ↑ Strategy |
| 5 | Deep Learning | ↓ Artificial Neural Networks |
| 6 | Strategy | ↓ Regression |
| 7 | Supply Chain | ↑ Grammar |
| 8 | Writing | ↓ Deep Learning |
| 9 | General Statistics | – General Statistics |
| 10 | Tensorflow | ↑ Problem-Solving |

Source

Coursera, produced for the World Economic Forum's New Metrics CoLab.

Note

Values in brown indicate where the hiring rate is lower than in 2019, while values in green indicate where the rate is higher than 2019. The darker the colour, the lower/higher the rate.

3

# Public and Private Sector Pathways to Reviving Labour Markets

The challenges facing labour markets today are significant but not insurmountable. To jointly lead economies and societies to greater prosperity, the public and private sector will need to tackle the factors that lead to the misallocation and waste of human capabilities and potential. For over half a century, economic thinkers have been able to track the benefits of expanding human skills and capabilities to economic prosperity.[39] One of the most valuable assets of any economy or company is its human capital–the skills, capabilities and innovation of its citizens. Distortions that undercut individuals' skills development and their ability to find a job that matches their current and potential capabilities erode the factors of economic productivity, innovation and growth that are derived from harnessing human skills and capabilities.[40]

To harness human potential towards greater prosperity and inclusion, leaders will need to shift talent from areas of decline to areas of growth in the economy. They will be called on to create effective systems for upgrading individual's skills and capabilities in line with emerging skills demand—in essence, expanding access and delivery of mid-career reskilling and upskilling through private and public sector investment and to ensure that such efforts by workers are rewarded with adequate job opportunities. To realize the value of such investments, businesses and governments will need to accompany such efforts with policies and practices that ensure that workers are able to prosper on the basis of merit rather than the misallocation of talent due to social strata or characteristics such as race or gender, strengthening the connection between personal income and productivity, and expanding safety nets to alleviate economic strain during periods of transition.

## 3.1 From temporary public policy relief to long-term solutions

As illustrated throughout this report, the COVID-19 pandemic has laid bare the lack of mechanisms to support workers through mid-career transitions and to ensure worker well-being and livelihoods amidst disruptions. What is needed is fundamental reform—or, more accurately, a revolution in the way education and training systems operate, and in how they interact with labour market policies and business approaches to training workers with new skills. This section reviews the current public policy ecosystem for ensuring adequate social protection, including new temporary measures put in place since the onset of COVID-19.

Reacting to the current social and economic crisis, countries across the globe have announced packages of emergency fiscal and monetary measures of unprecedented scope, and the pandemic has led to the temporary adoption of measures enhancing social safety nets for workers and households in a number of economies.

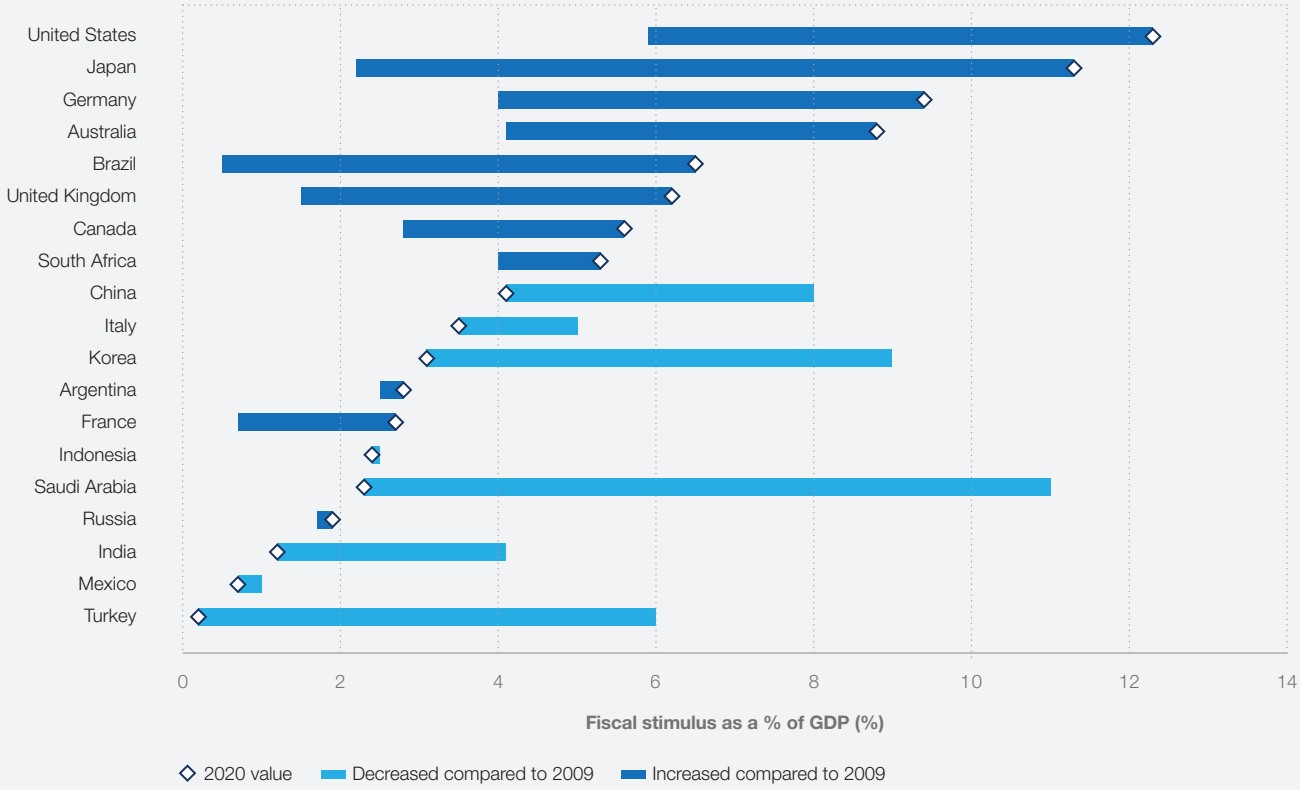
Governments and central banks have implemented fiscal and monetary packages of unique breadth and depth to counterbalance the economic impact of the pandemic as well as to protect workers and households. According to recent estimates by the IMF (International Monetary Fund), close to $11 trillion has been deployed through direct fiscal impulse and liquidity measures aimed at supporting households and businesses through the crisis.[41] As illustrated by Figure 32, the fiscal measures implemented by G20 countries in 2020 are larger than those taken during and just after Global Financial Criss in 2007–2008.[42] However, the breadth and scale of those policies remain out of reach for most developing economies, which have implemented less than half the number of measures implemented in developed economies. This continues to be a concern given that many developing economies still lack well-established health systems in addition to social safety nets.

In the immediate term it is possible to analyse the types of measures adopted and prioritized by different economies, while a longer-term horizon will allow a broader analysis of their overall efficacy. Data from the ILO presented in Figure 33 shows that more than 1,000 different policy measures have been implemented in more than 200 countries since the onset of the pandemic. They vary in focus and by instrument utilized. The majority of the measures observed span a range of agile policy solutions which have the capacity to protect the most vulnerable workers directly. While some instruments depend on in-kind services maintaining health, nutrition and having access to shelter, others focus on income stability, such as the widespread use of one-off cash transfers and allowances to subsidize household expenses, as well as a temporary extension and expansion of benefits to workers such as unemployment leave.

The timeliness and adaptability of cash transfer mechanisms have made them a critical tool to be deployed in the volatile context caused by COVID-19, which is why a number of governments across the world have expanded the provision and coverage of social protection schemes using this specific mechanism. However, the majority of the cash transfer measures implemented are time-bound and temporary and might not be the appropriate tool to provide the long-term economic relief necessary to vulnerable households. As illustrated in Figure 34, such mechanisms typically lasted one to three months, with only 16% of the programmes implemented as a result of the pandemic lasting longer than three months.[43] Going forward, an innovative approach to addressing the uncertain nature of recessions could be to introduce cash stimulus payments which would be "automatically triggered" by a deterioration in economic conditions, preventing administrative lag and indecision.[44]

FIGURE 32

**Comparing the size of selected economies' 2009-2020 fiscal stimulus packages, as share of economy GDP**




Source

Policy Tracker 12 June 2020, International Monetary Fund (IMF); International Institute of Labour Studies; and Transatlantic Institute.

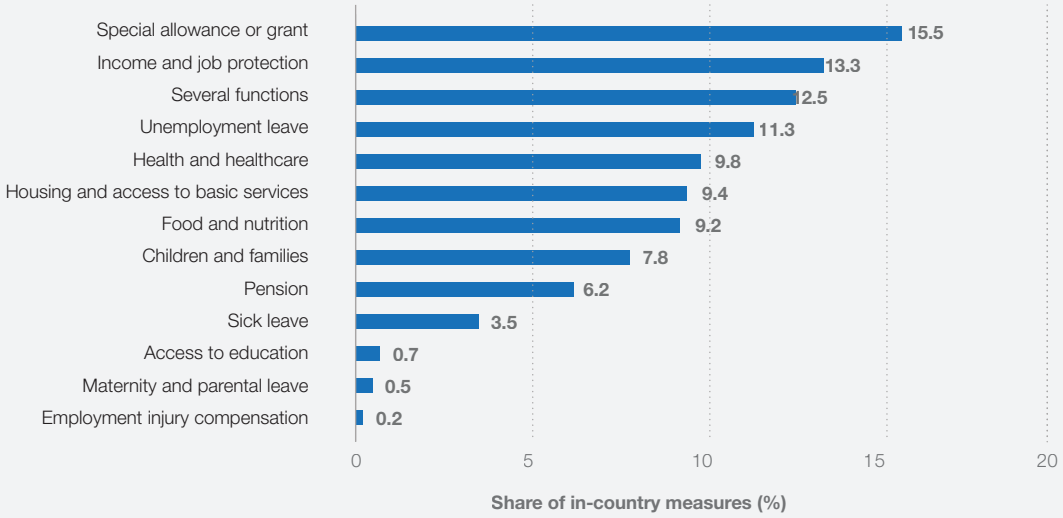
Note

Values include 'above-the-line' measures but exclude 'below-the-line measures' (equity injections, loans, asset purchase or debt assumptions, or guarantees).

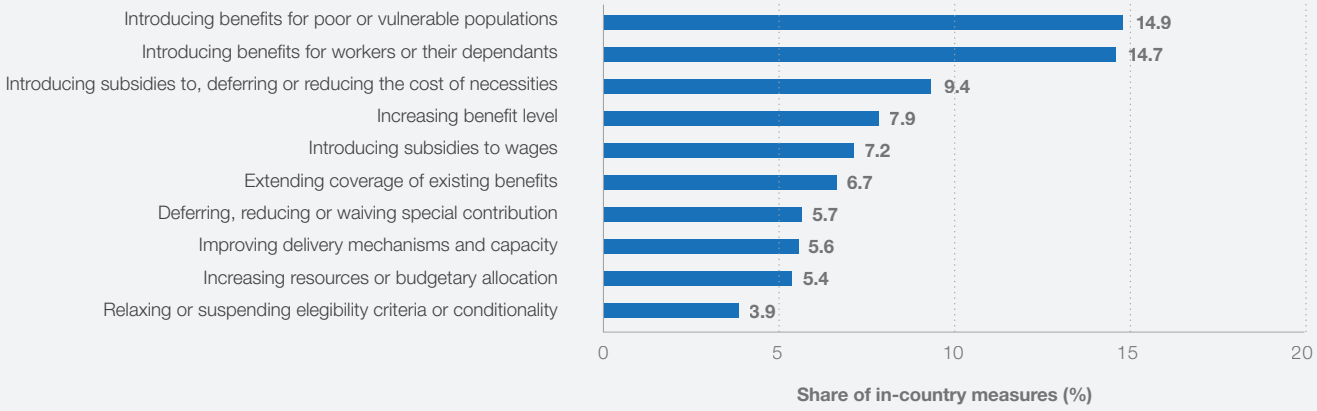
FIGURE 33

## Social protection measures introduced by governments, by type of instrument and function

### A. Function




### B. Instrument




Source

International Labour Organization (ILO) Social Protection Monitor, July 2020.

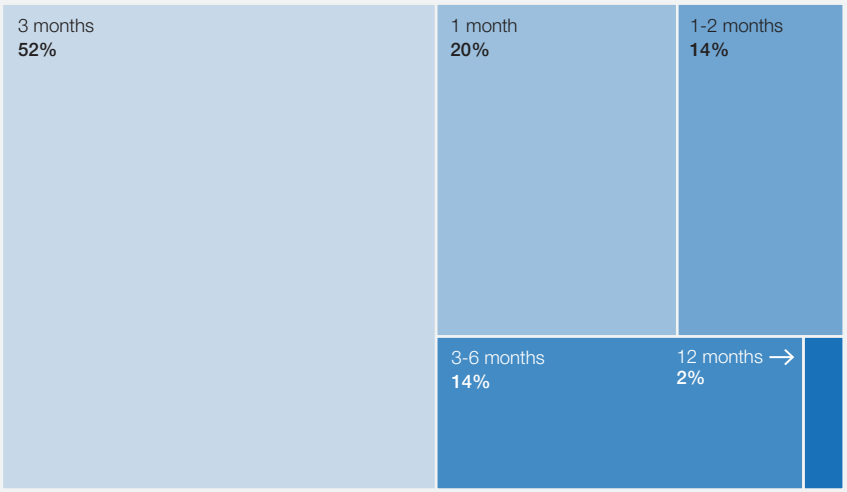
Note

The values represent the distribution of 1,218 measures introduced across 203 countries.

Another set of key policies has been focused on preserving the retention of staff by businesses through wage compensation schemes as well as tax or payment deferrals. Figure 35 presents the unprecedented use of job-retention schemes across several countries—notably New Zealand, France, Switzerland and the United Kingdom—affecting close to 60 million workers across OECD countries.[45] While these measures have been broadly welcomed and have been effective at buffering unemployment, such schemes obscure the possible true impact of COVID-19 on the labour market. It is only as wage support and replacement mechanisms begin to expire that some of the damage to the labour market will be revealed.

While these temporary measures provide a lifeline to workers during this unprecedented crisis and ahead of a future recovery, the need for an urgent response should be transformed into an impulse to enhance permanent social protection mechanisms. New data from the OECD shows the projected employment growth of a number of economies in 2019–2020 if countries experience a potential second wave of COVID-19 infections. Figure 36 plots that possible new reality against the Social Resilience pillar of the World Economic Forum's Global Social Mobility Index. The pillar score summarizes in one measure the level of social protection available in an economy alongside the presence of inclusive institutions.

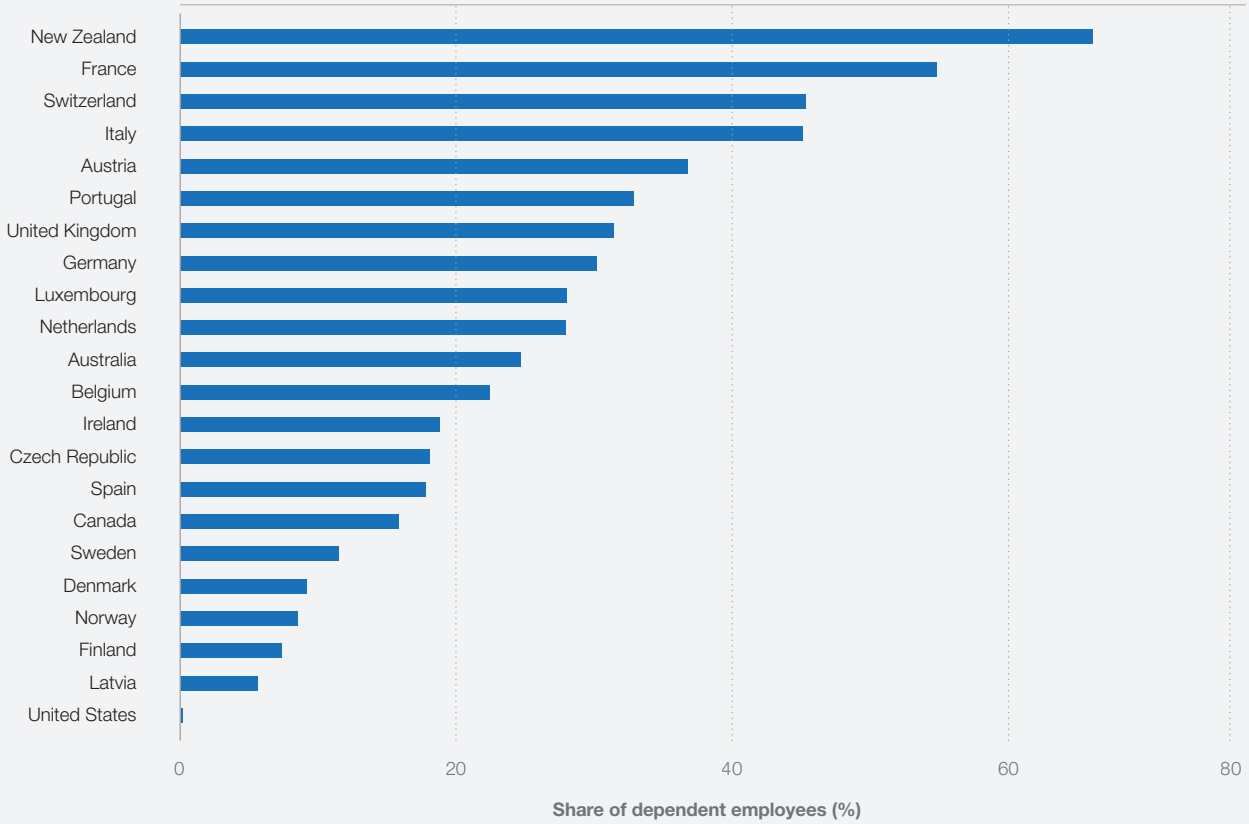
FIGURE 34 | **Duration of cash-transfer programmes in months**




Source

Gentilini, et al, 2020.

FIGURE 35 | **Participation in job-retention schemes**



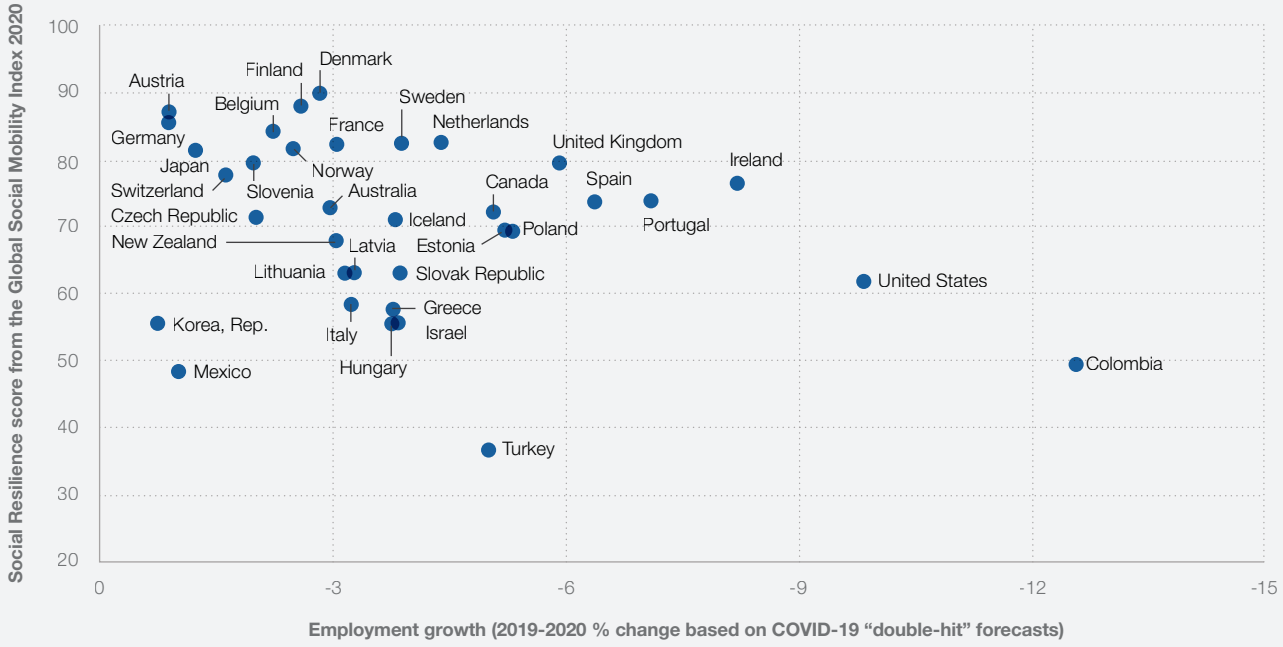

Source

*OECD Economic Outlook June 2020*, based on national sources.

Countries that score high have well-developed social safety nets and protection as well as high levels of public service efficiency. Countries in the bottom-left quadrant of Figure 36 have low social resilience scores and at the same time are projected to experience lower economic disruption under this scenario. Countries in that quadrant include Mexico and the Republic of Korea. Those in the top-right quadrant can expect to see high disruption to employment but also have a high social resilience score. They include Ireland, the United Kingdom and Spain. Countries in the bottom-right quadrant can expect to see high labour market disruption and also have a low social resilience score. Those countries include Colombia, Turkey and the United States. In summary, scenarios such as these suggest that some economies will experience a 'double-hit' scenario—relatively low coverage of social protection mechanisms in place to protect workers heavily displaced from the labour market.

FIGURE 36

**Projected impact of COVID-19 on employment growth against an index of social resiliance, OECD countries**




Source

*OECD Economic Outlook 2020*, OECD, and Social Mobility Index, World Economic Forum.

Note

Forecasts for Q4 2020 produced by the OECD assuming two waves of COVID-19, namely a "double hit" scenario.

The political will to expand social protection has often been deadlocked, driven by concerns about the long-term impact on labour market participation, the efficiency of current tools and the capacity of government to deliver these public services with the adequate efficiency at scale. Given the large-scale disruption to workers from both the pandemic-driven recession and the accelerated pace of technology adoption, the question cannot be 'if' but should be 'how' to expand some of these essential protections.

Research shows that wages have, for some time, been misaligned from productivity and that wage level can be as much determined by the structure of local labour markets or disadvantaged by race or gender as they are by workers receiving a reasonable return on their skills and productivity.[46] When it comes to preserving worker's ability to save, governments can cap the erosion of wages, ensuring that all workers are able to gain a living wage. The economic strain on families subsisting on low wages is not conducive to maximizing long-term human potential and leaves workers vulnerable to disruptions. Legislating against bias on the basis of gender, race or other characteristics protects the connection between employment, wages and the skills and capabilities of workers—guaranteeing that the talents of all parts of the population are used and can drive further growth and prosperity in the economy.

Past research has shown that long-term displacement from the labour market has a persistent, negative effect on workers.[47] When social protection mechanisms are lacking, individuals in the midst of a career transition are forced to maintain a dual focus—on the one hand trying to preserve their quality of life and keep poverty and potential destitution at bay, and on the other hand attempting to successfully transition to a new role.

For those with historically low wages, it is much more likely that basic needs such as health, nutrition and access to shelter become paramount and overwhelming concerns during such periods detract from productive and successful transitions to new roles. An individual's capacity to manage this labour market transition can thus be undermined, leading to rushed and potentially sub-par redeployment and re-employment.

While some social protection policies are remedial and short term, not all support can be temporary in nature. When it comes to long-term sick leave, disability leave or long-term unemployment, social protection becomes a fundamental pillar of the support for its citizens on an ongoing basis. For the purposes of this report we have focused on supporting the bounceback of those who are or will be unemployed in the short term due to the recession and technological change. To expand safety nets in the medium to long term, societies will need to rebalance current public spending and consider expanding fiscal room through effective and appropriate taxation.

Governments can proactively shape the preconditions for effective labour market transitions and worker productivity by strengthening the link between skills, wages and employment. This can be achieved through policies that fund reskilling and upskilling of workers who are mid-way through their career and will need further skills to secure employment in the future of work, policies which ensure that workers are able to create cash reserves during periods of employment, and policies which legislate against bias in hiring, firing and setting wages. Reskilling and upskilling policies that have been utilized to date span the conditionality of unemployment benefits on taking up new re-skilling and up-skilling, providing wage subsidies to companies which extend reskilling and upskilling to workers, providing online learning accounts to citizens, and starting to fund online learning in addition to university degrees, TVET and school tuition.

A number of countries have in recent years developed innovative funding mechanisms to finance reskilling of workers. Singapore recently complemented its pioneering Skills Future Initiative through the deployment of Enhanced Training Support Package (ETSP)[48] to support workers and organizations in sustaining investment in reskilling and upskilling during COVID-19. The package includes a significant increase in funding for Absentee Payroll Support and Course Fee Support among industries severely hit by the pandemic. At the end of 2019, France created an individual skills account with an integrated mobile application dedicated to vocational training and lifelong learning. Under the "moncompteformation.gouv.fr" ("MySkillsAccount") scheme, 28 million eligible full- and part-time workers will receive €500 annually directly into their skills account to spend on upskilling and continuous learning, with low-skilled workers and those with special needs receiving up to €800 annually, capped at a total of €5,000 and €8,000, respectively. The Danish Ministry of Employment has introduced a number of measures aimed at providing additional opportunities for upskilling and job-focused education aimed at workers furloughed following as a consequence of the economic impact of the pandemic. First, both skilled and unskilled workers who pursue a vocational education are being provided with 110% of their usual unemployment benefits. Additionally, the Danish government expanded the scope of its current apprenticeship scheme, at the same time as prolonging its job rotation scheme, making it possible for more unskilled workers to have access to upskilling and reskilling opportunities.

## 3.2 From deploying human resources to leveraging human potential

As changes to work accelerate, employers are bearing witness to a fundamental shift away from the linear transitions made by workers in previous points of history from school, into specialized training, into work and then along a progressive career ladder, defined by increasing responsibility within an established occupation structure. In today's labour market, workers pivot between professions with significantly different skill sets, and navigate mid-career job transitions accompanied by substantial reskilling and upskilling. Those pivots are as important to the success of firms as they are to the prosperity of workers. Without such pivots skills shortages will remain endemic and a scarcity of adequately skilled individuals to fill the jobs of tomorrow will lead to a persistent productivity lag.

The route to unlocking the value of human potential in tandem with profitability is to employ a 'good jobs strategy', halting the erosion of wages, making work meaningful and purposeful, expanding employees' sense of growth and achievement, promoting and developing talent on the basis of merit and proactively designing against racial, gender or other biases.[49]

Fundamental to this strategy are two inter-connected, ambitious priorities which, between them, have the power to pave the way to a better, more productive and more rewarding future of work: 1) increasing company oversight of strategic people metrics; 2) effective job transitions from declining to emerging roles through well-funded reskilling and upskilling mechanisms.

There is an emerging consensus among companies that long-term value is most effectively created by serving the interests of all stakeholders. Companies that hold themselves accountable will be both more viable and valuable in the long-term. To do so, companies need a series of new metrics which can, at the Board and C-suite level, make visible the impact companies have on key desirable outcomes to governance, planet, people and prosperity.[50]

In collaboration with the International Business Council (IBC) the World Economic Forum has defined a set of key metrics which can track how businesses are creating broader, long-term value through an investment in human and social capital. People are at the heart of all organizations as investors, workers, customers, suppliers, distributors and contractors. The well-being, productivity and prosperity of individuals is at the core of all successful economies and firms. Human ingenuity is at the core of companies' competitive advantage and no firm can prosper for long if it proves damaging to the social fabric around it. In the framework outlined within the paper *Measuring Stakeholder Capitalism*, the Forum in collaboration with the IBC have identified a set of key measures that track: the representation of employees by age group, gender, ethnic and racial category and other markers of diversity; the pay equity between those different groups; the wage levels paid within the organization as a ratio to local minimum wage and the ratio of CEO pay to median employee pay; hours of training undertaken by employees; and average training investment by company. In addition to these core measures the report outlines basic standards of good work such as ensuring health and safety, as well as eliminating child and forced labour.[51]

To complement such key oversight metrics, businesses can benefit from more granular operational metrics which quantify the human capital—the skills and capabilities of employees—within an organization. Currently, business leaders lack the tools to adequately illustrate, diagnose and strategize for talent capacity. While businesses and economies have extensive systems to account for monetary assets at their disposals, there is a lag in establishing the value of human skills and capabilities. The losses incurred by talent attrition as well as the gains of acquiring individuals with exceptional skills or of developing talent pools through strong reskilling and upskilling programmes remain unrecorded and unobserved.

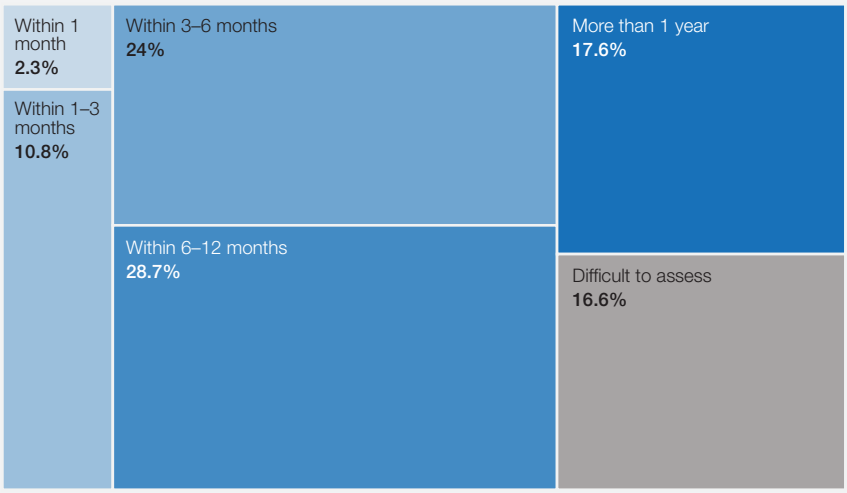
Companies without the tools to account for the value of skills and capabilities lack oversight of the depreciation or appreciation of one of their key intangible assets—the capabilities of their workforce. Without that oversight, setting the right investment strategy for reskilling and upskilling becomes a challenging feat. A recent World Economic Forum report, authored in collaboration with Willis Towers Watson, *Human Capital as an Asset: An accounting framework for the new world of work*, identifies additional areas of measurement that can start to quantify the value of human capital within an organization.[52] In the outlined framework are the labour market value of the aggregate talent in an organization, the value added through additional reskilling and upskilling into job-relevant skills and the depreciation of those assets through gradual skills redundancy and a decrease in workforce engagement. The approaches to undertaking this quantification are in their infancy and there is need for further efforts to expand such efforts.

Frameworks to track the value of human capital in company balance sheets, to determine a re-investment strategy for human capital through redeployment, reskilling and upskilling, as well as to account for return on investment remain nascent. It is therefore not surprising that few Future of Jobs Survey respondents expected a return on investment from reskilling and upskilling workers within the first three months after employees complete reskilling, and that 17% of businesses remain unsure about the return on investment from reskilling. Survey responses also indicate that companies continue to struggle to quantify the scale of reskilling and upskilling investment that their companies currently make.

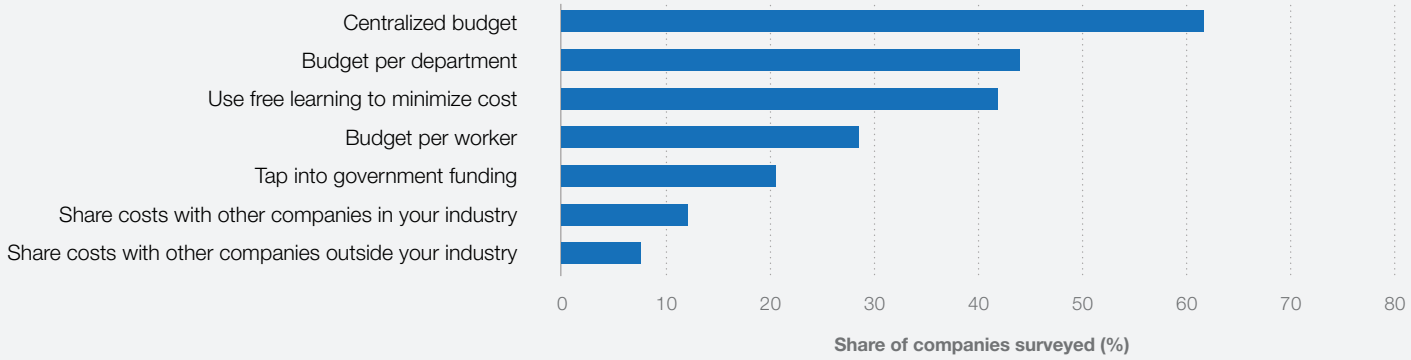
The Future of Jobs Survey signals that companies hope to internally redeploy 50% of workers displaced by technological automation and augmentation, but cross-cutting solutions and efficiencies for funding job transitions remain under-explored. Amidst the accelerated arrival of the automation and augmentation of work, as well as the job destruction brought about by COVID-19, businesses require a fast, agile and coherent workforce investment strategy. In collaboration with the leaders engaged with the New Economy and Society work at the World Economic Forum we have been able to identify a set of key elements of a successful workforce investment strategy. They include identifying workers who are being displaced from their roles; establishing appropriate internal committees to manage the displacement; funding reskilling and upskilling either wholly out of company budgets or by tapping into government funding; motivating employee engagement in this process; and tracking the long-term success of such transitions.

FIGURE 37 | **Investment into employee reskilling and upskilling**

**A. Perceived time period to receive return on investment**




**B. Source of funding**




Source

Future of Jobs Survey 2020, World Economic Forum.

Company leaders can ensure the success of workforce strategies by directing the transition of employees with empathy, within the rule of law, in line with company values and culture, by ensuring outcomes are equitable, and by directing learning to effective resources and meaningful curricula. A range of motivating factors can fuel reskilling and upskilling uptake—connected broadly to employees' sense of purpose, meaning, growth and achievement. Employers can signal the market value of new online-first credentials by opening up role opportunities to new cohorts of workers who have completed mid-career reskilling and upskilling. Employers can make broader use of hiring on the basis of potential rather than current skill sets and match potential-based hiring with relevant training. The data featured in this report has shown that a number of emerging roles are already staffed by individuals who first transition into those positions and then 'grow into' the full skill set required. As an overarching principle, business leaders need to place equity and diversity at the heart of their talent ecosystem, ensuring that employees believe in their capacity to prosper based on merit.

Expanding effective workforce strategies requires strong capabilities in real time, as well as dynamic mapping of the types of opportunities that remain available to workers displaced by the COVID-19 pandemic and the fast pace of automation. A set of technology companies which are broadly classed as EdTech and reskilling services companies can support the

process of redeploying workers into the jobs of tomorrow.[53] Such companies utilize advanced data and AI capabilities matched with user interfaces that guide workers and managers through to discovering possible pathways into new job roles. The data featured in sections 2.2 and 2.3 already indicates the types of insights that can be accessed through such services—dynamically matching opportunities to workers, identifying possible job destinations and singling out bridging skill sets. Companies with such capabilities can become part of a new infrastructure for the future of work which powers worker transitions from displaced to emerging roles. The efforts of matching workers to possible opportunities can be complemented by the delivery of reskilling and upskilling at scale through educational technology services.

Finally, the necessary reskilling and upskilling demands substantial attention and broad-base systemic solutions to funding the job transitions which the current labour market context requires at an unprecedented pace and scale. As demonstrated in Figure 37, the Future of Jobs survey shows that 66% of businesses believe they can see return on investment within a year of funding reskilling for the average employee. It remains concerning, however, that the survey also reveals that only 21% of businesses report being able to make use of public funds, and merely 12% and 8% collaborate across companies and within industries, respectively. Previous estimates have shown that businesses can independently reskill some employees with positive return on investment; however, the employees who are most disrupted and with the largest need of reskilling are likely to need a larger investment.[54]

This report calls for renewed efforts to understand the division of spend on reskilling and upskilling workers between business and the public sector. A typical return on investment framework considers the costs on the side of both businesses and governments under various scenarios—such as the extent of training costs, the cost of employees taking time out of work, and the need to pay unemployment benefits. On the benefits of reskilling and upskilling workers, a calculation takes into account avoided severance and hiring costs borne by business, the avoided lag in productivity when onboarding new employees and the additional productivity of employees who feel supported and are thriving. Additional benefits to governments include the income tax dividends of citizens who are employed as opposed to out of work.

A number of companies have in recent years experimented with a range of approaches to reskilling and upskilling. The role of business in such a programme can be to directly drive such efforts and define the approach to reskilling and upskilling. In other cases, businesses can be in a supporting role, agreeing to redefine their approach to hiring and accept candidates who have been reskilled through new types of credentials. In one example, Telecommunication company AT&T has worked with Udacity to create 50 training programmes designed to prepare individuals for the technical careers of the future which are distinctively relevant to AT&Ts future workforce and digital strategies.[55] In particular, these strategies include courses focused on skills in web and mobile development, data science and machine learning. To date AT&T has spent over $200 million per year to design this internal training curriculum, known as T University, and has already achieved over 4,200 career pivots with 70% of jobs filled internally by those that were reskilled. In a similar effort, Shell launched an online education effort titled the Shell.ai Development Program, which focuses on teaching artificial intelligence skills to its employees.[56] Both programmes have created customized versions of Udacity's Nanodegree programs to reskill and upskill employees with hard-to-source, in-demand skill sets.

An additional example is provided by Coursera for Government.[57] At the start of the COVID-19 pandemic, a number of countries experienced a surge in unemployment. Governments in over 100 countries provided access to the platform to citizens looking to gain new skills and credentials to re-enter the workforce. The programmes connected graduates directly with local companies who agreed to accept those credentials as the basis of hiring decisions. Since April, this programme has reached 650,000 unemployed workers who enrolled in over 2.5 million courses that provide the skills needed for fast-growing jobs in IT, healthcare and business. In one example, Costa Rica's government has worked with local employers across the country to identify current job openings and skill demand and tailored the programme offering to that local demand. Similar structures of collaboration have been established across local government in the United States, specifically across a network of job centres.

# Conclusion

The ongoing disruption to labour markets from the Fourth Industrial Revolution has been further complicated—and in some cases accelerated—by the onset of the pandemic-related recession of 2020.

The most relevant question to businesses, governments and individuals is not to what extent automation and augmentation of human labour will affect current employment numbers, but under what conditions the global labour market can be supported towards a new equilibrium in the division of labour between human workers, robots and algorithms. The technological disruptions which were in their infancy in previous editions of the *Future of Jobs Report* are currently accelerated and amplified alongside the COVID-19 recession as evidenced by findings from the 2020 Future of Jobs Survey. While it remains difficult to establish the long-term consequences of the pandemic on the demand for products and services in severely affected industries, supporting workers during this transition will protect one of the key assets of any company and country—its human capital.

In this new context, for the first time in recent years, job creation is starting to lag behind job destruction—and this factor is poised to affect disadvantaged workers with particular ferocity. Businesses are set to accelerate the digitalization of work processes, learning, expansion of remote work, as well as the automation of tasks within an organization. This report identifies one result of the pandemic as an increasing urgency to address the disruption underway both by supporting and retraining displaced workers and by monitoring the emergence of new opportunities in the labour market.

As unemployment figures rise, it is of increasing urgency to expand social protection, including support for retraining to displaced and at-risk workers as they navigate the paths towards new opportunities in the labour market and towards the 'jobs of tomorrow'. Addressing the current challenges posed by COVID-19, in tandem with the disruption posed by technological change, requires renewed public service innovation for the benefit of affected workers everywhere. It also demands that leaders embrace stakeholder capitalism and pay closer attention to the long-dividends of investing in human and social capital. The current moment provides an opportunity for leaders in business, government, and public policy to focus common efforts on improving the access and delivery of reskilling and upskilling, motivating redeployment and reemployment, as well as signalling the market value of learning that can be delivered through education technology at scale.

To address the substantial challenges facing the labour market today, governments must pursue a holistic approach, creating active linkages and coordination between education providers, skills, workers and employers, and ensuring effective collaboration between employment agencies, regional governments and national governments.

Such efforts can be strengthened by multistakeholder collaboration between companies looking to support their workforce; governments willing to fund reskilling and the localization of mid-career education programmes; professional services firms and technology firms that can map potential job transitions or provide reskilling services; labour unions aware of the impact of those transitions on the well-being of workers; and community organizations that can give visibility to the efficacy of new legislation and provide early feedback on its design.

# Notes

1. World Economic Forum, 2020a.
2. Baldwin, 2019.
3. Acemoglu, et al, 2020.
4. World Economic Forum, 2018, DeVries, et al, 2020, and Frey and Osborne, 2013.
5. Ding and Saenz Molina, 2020.
6. Hale, et al, 2020.
7. Ibid.
8. YouGov, 2020.
9. OECD, 2020a.
10. OECD, 2020a.
11. Ibid.
12. OECD, 2020b.
13. Delfs and Colitt, 2020, and Migliaccio, et al, 2020.
14. Ravn and Sterk, 2017, and Farber, 2011.
15. ILO, 2020.
16. COVID Inequality Project, https://sites.google.com/view/covidinequality/.
17. Author's calculations based on data in Dingel, et al, 2020.
18. De Vries, et al, 2020.
19. Author's calculations based on data in Dingel, et al, 2020.
20. Zhao, 2020.
21. Job-seekers searching for roles on the LinkedIn platform using built-in remote job filters, normalized against changes to all job searches.
22. The share of job postings, which use number of keywords (i.e. 'remote work', 'work from home', home office') in 10 different languages, as well as built-in remote job filters.
23. LinkedIn analysed data from job search behaviour and job postings of full-time roles and its changes due to COVID-19 during the period of 11 February to 1 July. Analysts utilized the 'remote work' filter and a set of searchable key words such as 'remote work', 'work from home', 'homeoffice' in 10 different languages. The index is the start of the analysis period, 11 July. Results are normalized for platform growth as well as in the case of job searchers against the volume of job searches. The daily figures represent a seven-day smoothed proportion.
24. Kimbrough, 2020.
25. Mongey, et al, 2020.
26. World Bank, 2020.

27. Cook, et al, 2019.

28. ADP provides human capital management services to significant numbers of US companies. Its data can therefore act as a reliable proxy for changes to the American labour market.

29. Workers are considered to have dropped out of employment if they disappear from the ADP database. While some of those variations can reflect worker movements to companies which do not use ADP's services, the scale of that effect is not typically as large; therefore, on the basis of past trends we can deduce that what we are reporting are reach changes to employment.

30. Data from FutureFit AI combines over 50 data sources on workforce demand and supply, translating a range of taxonomies of jobs and skills. Supply-side sources include over 350 million talent profiles listing 30,000 skills clusters, 80,000 job titles, hundreds of industries, thousands of learning opportunities and millions of companies worldwide. The data set used comes from worker profile information sourced from resumes and online professional profiles. It also includes key data points for the analysis—such as employers, start and end dates, job role, industries and employment sequence, among others.

31. This metric covers approximately 300,000 young professionals in the United States, defined here as those who have graduated with an upper secondary or tertiary (undergraduate) degree no earlier than 2008, and have held 15 or less positions and have not been in the labour market for longer than 20 years. These professionals have, on average, eight years of work experience after or during a student's first degree. The average work experience tenure following graduation is 6.7 years. The overwhelming majority of this sample are in their first working decade.

32. Agopsowicz, 2019.

33. See, for example: Arntz, Melanie, Terry Gregory and Ulrich Zierahn, *The risk of automation for jobs in OECD countries: a comparative analysis,* OECD Social, Employment and Migration Working Papers No 189, Organization for Economic Cooperation and Development (OECD), 2016; *McKinsey Global Institute, A Future That Works: Automation, Employment, and Productivity,* McKinsey Global Institute (MGI), 2017; PwC, *Will robots really steal our jobs? An international analysis of the potential long term impact of automation,* 2018. For a range of relevant additional considerations, see: van der Zande, Jochem, et al., *The Substitution of Labor: From technological feasibility to other factors influencing job automation*, Innovative Internet: Report 5, Stockholm School of Economics Institute for Research, 2018.

34. Ding and Saenz Molina, 2020.

35. World Economic Forum, 2020a.

36. For more details on how the clusters are computed please refer to World Economic Forum, 2020a.

37. For an in-depth analysis of emerging jobs please see World Economic Forum, 2020a.

38. According to Coursera data from individuals completing reskilling and upskilling on its platform, working towards a new skill in Cloud Computing could take on average 106 full calendrical days; in Content, 24 days; in Data and AI professions, 60; in Engineering, 77 days; in Marketing, 39; People and Culture, 36; Sales. 37; and in Product Development professions, 44. We take the average month to have 21 working days.

39. Sweetland, 1996.

40. Hsieh, et al., 2019.

41. IMF, 2020.

42. Atlantic Council, 2020.

43. Gentilini, et al, 2020.

44. Economic Security Project, 2020.

45. OECD, 2020b.

46. Cahuc, et al, 2006, and Carroll, et al, 2016.

47. Deelen, 2018.

48. "Skills Future Enhanced Training Support Package", https://www.enterprisejobskills.sg/content/upgrade-skills/enhanced-training-support-for-SME.html.

49. Ton, 2014, and https://goodjobsinstitute.org/good-jobs-scorecard/.

50. For more details on the overall framework please see Word Economic Forum, 2020b.

51. For the complete report, see https://www.weforum.org/reports/measuring-stakeholder-capitalism-towards-common-metrics-and-consistent-reporting-of-sustainable-value-creation.

52. For the complete report, see https://www.weforum.org/reports/human-capital-as-an-asset-an-accounting-framework-to-reset-the-value-of-talent-in-the-new-world-of-work.

53. World Economic Forum, 2020c.

54. World Economic Forum, 2019.

55. For details, see https://blog.udacity.com/2018/09/udacity-and-att-join-forces-to-train-workers-for-the-jobs-of-tomorrow.html.

56. For details, see https://www.shell.com/energy-and-innovation/digitalisation/digital-technologies/shell-ai/shell-ai-residency-programme.html.

57. For details, see https://www.coursera.org/government.

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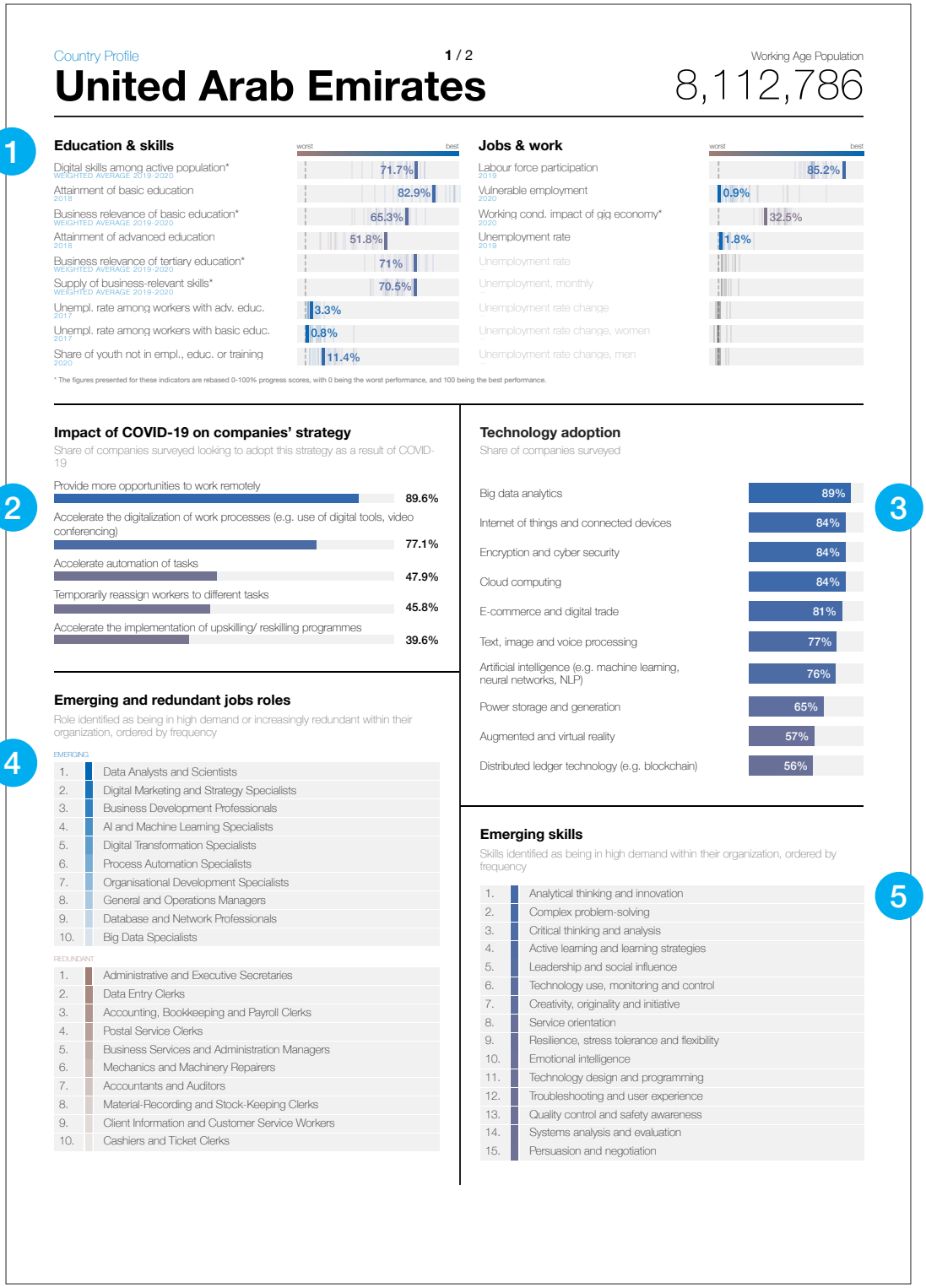
# Part 2 Country and Industry Profiles

Part 2 of the report presents data findings through both an industry and country lens, with the aim of providing specific practical information to decision-makers and experts from academia, business, government and civil society. Complementing the cross-industry and cross-country analysis of results in Part 1, this section provides deeper granularity for a given industry and country through dedicated Industry Profiles and Country Profiles. Profiles are intended to provide interested companies and policy-makers with the opportunity to benchmark their organization against the range of expectations prevalent in their industry and/or country. This User's Guide provides an overview of the information contained in the various Industry Profiles and Country Profiles and its appropriate interpretation.

# User's Guide

## How to Read the Country and Industry Profiles

## Country Profiles



Country Profile

2 / 2

# United Arab Emirates

Working Age Population

8,112,786

6

### Current skills in focus of existing reskilling/upskilling programmes

Share of companies surveyed identifying this skill as being in focus across their reskilling or upskilling programs

| | |
|---|---|
| 1. | Active learning and learning strategies |
| 2. | Leadership and social influence |
| 3. | Analytical thinking and innovation |
| 4. | Quality control and safety awareness |
| 5. | Complex problem-solving |
| 6. | Critical thinking and analysis |
| 7. | Management of personnel |
| 8. | Creativity, originality and initiative |
| 9. | Technology use, monitoring and control |
| 10. | Service orientation |

7

### Average reskilling needs

Share of workforce of companies surveyed within this data

DURATION OF RESKILLING

8

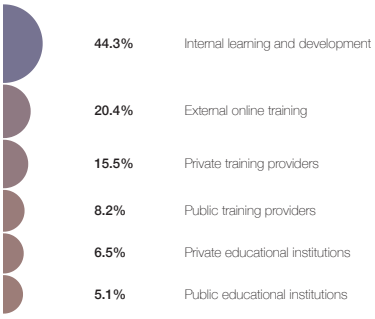
### Responses to shifting skill needs

Share of companies surveyed

9

### Projected use of training providers

Share of companies surveyed



# 1. Hard data contextual indicators: Education & skills/ Jobs & work

This section aims to provide the reader with the latest available data from contextual indicators on education, skills, jobs and work. To allow for an understanding of the indicators of different nature and magnitude, the contextual indicators not expressed as a percentage have been normalized on a 0 to 100 scale, providing a 'progress score' for each indicator.

The total working age population is displayed in the top right corner of the page. The working-age population is the number of people aged 25 and over. In addition to using a minimum age threshold, certain countries also apply a maximum age limit.

**Period**: 2019 or latest available data (accessed September 2020).
**Source**:*ILOstat*, International Labour Organization.

## Education & skills

**Digital skills among active population:**
Score computed based on the average response of companies operating in this country to the Executive Opinion Survey question "In your country, to what extent does the active population possess sufficient digital skills (e.g. computer skills, basic coding, digital reading)?" [1 = not all; 7 = to a great extent]. Results converted to a 0-100 score called 'progress score', where 100 corresponds to the best possible frontier and 0 to the worst possible frontier.

**Period**: 2019–2020 weighted average or most recent period available.
**Source**: World Economic Forum, Executive Opinion Survey 2020.

**Attainment of basic education:**
Percentage of the population aged 25 and over with at least a secondary education (includes ISCED 2-4). This data is cumulative, which means that those with tertiary education are counted in the figures.

**Period**: 2018 or latest available data (accessed September 2020).
**Source**: UNESCO, Institute for Statistics, Education Indicators.

**Business relevance of basic education:**
Score computed based on the average response of companies operating in this country to the Executive Opinion Survey question "In your country, to what extent do secondary-education graduates possess the skills needed by businesses?" [1 = not all; 7 = to a great extent]. Results converted to a 0-100 score called 'progress score', where 100 corresponds to the best possible frontier and 0 to the worst possible frontier.

**Period**: 2019–2020 weighted average or most recent period available.
**Source**: World Economic Forum, Executive Opinion Survey 2020.

**Attainment of advanced education:**
Percentage of the population aged 25 and over with a tertiary education (includes ISCED 5-8).

**Period**: 2018 or latest available data (accessed September 2020).
**Source**: UNESCO Institute for Statistics, Education Indicators.

**Business relevance of tertiary education:**
Score computed based on the average response of companies operating in this country to the Executive Opinion Survey question "In your country, to what extent do university graduates possess the skills needed by businesses?" [1 = not all; 7 = to a great extent]. Results converted to a 0-100 score called 'progress score, where 100 corresponds to the best possible frontier and 0 to the worst possible frontier.

**Period**: 2019–2020 weighted average or most recent period available.
**Source**: World Economic Forum, Executive Opinion Survey 2020.

**Supply of business relevant skills:**
Score computed based on the average response of companies operating in this country to the Executive Opinion Survey question "In your country, to what extent can companies find people with the skills required to fill their vacancies?" [1 = not at all; 7 = to a great extent]. Results converted to a 0-100 score called 'progress score', where 100 corresponds to the best possible frontier and 0 to the worst possible frontier.

**Period**: 2019–2020 weighted average or most recent period available.
**Source**: World Economic Forum, Executive Opinion Survey 2020.

**Unemployment rate among workers with basic education:**
The unemployment rate among workers with basic education is the number of persons who are unemployed as a percentage of the total number of employed and unemployed persons (i.e. the labour force). Data by level of education is provided on the highest level of education completed (includes ISCED 2-4).

**Period**: 2019 or latest available data (accessed September 2020).
**Source**: *ILOstat*, International Labour Organization.

**Unemployment rate among workers with advanced education:**
The unemployment rate among workers with advanced education is the number of persons who are unemployed as a percentage of the total number of employed and unemployed persons (i.e. the labour force). Data by level of education is provided on the highest level of education completed. (includes ISCED 5-8).

**Period**: 2019 or latest available data (accessed September 2020).
**Source**: *ILOstat*, International Labour Organization.

**Share of youth not in employment, education or training:**
This is the share of youth not in employment, education or training (NEET). Values represented are ILO modelled estimates.

Please note that imputed observations are not based on national data, are subject to high uncertainty and should not be used for country comparisons or rankings. This indicator refers to the proportion of youth who are not in employment and not in education or training. For statistical purposes, youth are defined as persons between the ages of 15 and 24 years. For more information, refer to the indicator description and the ILO estimates and projections methodological note.

**Period**: November 2019.
**Source**: *ILOstat*, International Labour Organization.

## Jobs & work

**Labour force participation:**
The labour force participation rate is the proportion of the working-age population actively engaged in the labour market. The share of the population either in employment or looking for employment as a percentage of the total working age population.

Period: 2019 or latest available data (accessed September 2020).
Source: *ILOstat*, International Labour Organization.

**Vulnerable employment:**
Vulnerable employment is defined as contributing family workers and own-account workers as a percentage of total employment.

**Period**: 2020 or latest available data (accessed September 2020).
**Source**: *ILOstat*, International Labour Organization.

**Erosion of working conditions impacted by gig economy:**
Score computed based on the average response of companies operating in this country to the Executive Opinion Survey question "In your country, what is the impact of the online gig economy on working conditions (e.g., working time, remuneration, stability)?" [1= Significantly worsen working conditions; 7= Significantly improves working conditions]. Results converted to a 0-100 score called 'progress score', where 100 corresponds to the best possible frontier and 0 to the worst possible frontier.

**Period**: 2019–2020 weighted average or most recent period available.
**Source**: World Economic Forum, Executive Opinion Survey 2020.

**Unemployment rate (latest annual), latest available quarterly), (latest monthly) :**
The latest annual unemployment rate is calculated by expressing the number of unemployed persons as a percentage of the total number of persons in the labour force. The labour force (formerly known as the economically active population) is the sum of the number of persons employed and the number of persons unemployed. Thus, the measurement of the unemployment rate requires the measurement of both employment and unemployment. The unemployed comprise all persons of working age who were: a) without work during the reference period, i.e. were not in paid employment or self-employment; b) currently available for work, i.e. were available for paid employment or self-employment during the reference period; and c) seeking work, i.e. had taken specific steps in a specified recent period to seek paid employment or self-employment. Future starters, that is, persons who did not look for work but have a future labour market stake (made arrangements for a future job start) are also counted as unemployed, as well as participants in skills training or retraining schemes within employment promotion programmes, who on that basis, were "not in employment", not "currently available" and did not "seek employment" because they had a job offer to start within a short subsequent period generally not greater than three months and persons "not in employment" who carried out activities to migrate abroad in order to work for pay or profit but who were still waiting for the opportunity to leave.

**Period**: Latest available data for each period (accessed September 2020).
**Source**: *ILOstat*, International Labour Organization.

**Unemployment rate (2019-2020 Q2 change, (2019-2020 Q2 change by gender)**
These values represent the change in unemployment rate from 2019 year-end to Q2 2020, using the figures sourced above. We also featured these figures above broken down by gender.

**Period**: Latest available data for each period (accessed September 2020).
**Source**: *ILOstat*, International Labour Organization.

## 2. Impact of COVID-19 on companies strategies:

This bar chart shows the top five measures organizations are planning on implementing in response to the current COVID-19 outbreak as a share of survey respondents from companies operating in the country. It is based on the responses to the following question "In response to the current outbreak, which of the following measures has your company implemented or is planning to implement across the Organization?" from the Future of Jobs Survey.

**Period**: 2020.
**Source**: World Economic Forum, Future of Jobs Survey 2020.

## 3. Technology adoption:

This bar chart represents the share of survey respondents from companies operating in the country who indicated that, by 2025, their company was "likely" or "very likely" (on a 5-point scale) to have adopted the stated technology as part of its growth strategy. For a more detailed discussion of each technology, please refer to the "Technological adoption" section in chapter 2 of the report.

**Period**: 2020.
**Source**: World Economic Forum, Future of Jobs Survey 2020.

## 4. Emerging and redundant job roles:

This table provides an overview of job roles expected to see an increase and decrease in demand across the country over the 2020–2025 period. The individual job roles listed are for illustrative purposes and report the job roles most frequently cited by survey respondents from companies operating in the country. Categorization of job roles is adapted from the O*NET labour market information system (see Appendix A: Report Methodology for details).

**Period**: 2020.
**Source**: World Economic Forum, Future of Jobs Survey 2020.

## 5. Emerging skills:

The table provides the list of skills the country respondents have selected as being increasingly important within their organization. It is based on the responses to the following question "Keeping in mind the tasks that will be performed by the key roles in your organization, in the next four years would you expect an increase or decrease in the use of the following skills by individuals?" from the Future of Jobs Survey. The skills are ranked by frequency and ranked from 1 to 15. The full list of skills is based on the O*NET classification and available in the appendix section of this report.

**Period**: 2020.
**Source**: World Economic Forum, Future of Jobs Survey 2020.

## 6. Current skills in focus of existing reskilling/upskilling programmes:

The table provides the list of skills that are the focus of existing company reskilling/upskilling programmes for companies based in the country. It is based on the responses to the following question "Keeping in mind your current strategic direction, select the top 10 skill clusters that you are currently focusing your reskilling/upskilling efforts on?" from the Future of Jobs Survey. The skills are ranked from 1 to 15, with 1 being the skill for which most organizations offer training. The full list of skills is based on the O*NET classification and available in the appendix section of this report.

**Period**: 2020.
**Source**: World Economic Forum, Future of Jobs Survey 2020.

## 7. Average reskilling needs:

The treemap shows the estimated time needed to reskill each share of the workforce that needs reskilling within the country. It is based on the responses to the following question "Bearing in mind the evolving skill demand, how long do you expect the reskilling/upskilling of your employees to take?"

from the Future of Jobs Survey. Respondents were asked to provide as share of their workforce for each duration of reskilling/upskilling.

**Period**: 2020.
**Source**: World Economic Forum, Future of Jobs Survey 2020.

## 8. Response to shifting skill needs:

The bar chart shows the top strategies organizations will undertake to address the shifting skills demand as a share of survey responses from companies operating in the country. It is based on the responses to the following multiple-choice question "How likely is your organization to undertake the following strategies to address the shifting skills demand?" from the Future of Jobs Survey.

**Period**: 2020.
**Source**: World Economic Forum, Future of Jobs Survey 2020.

## 9. Projected use of training providers:

The chart shows the projected proportion of the use of different training providers for the future training programmes of companies based in the country. It is based on the responses to the following question "In your future retraining programme, what proportion of training provision will come from the options mentioned below?" from the Future of Jobs Survey.

**Period**: 2020.
**Source**: World Economic Forum, Future of Jobs Survey 2020.

# Industry Profiles

Industry Profile

1 / 2

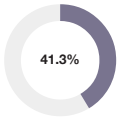
## Advanced Manufacturing

1

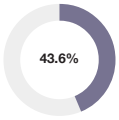
14%

**Average share of workers at risk of displacement**

**Expected redeployment success rate of displaced workers**



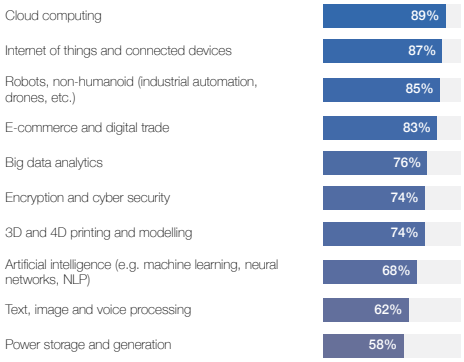

**Average skills instability among workforce**




2

### Technology adoption in industry

Share of companies surveyed




3

### Emerging skills

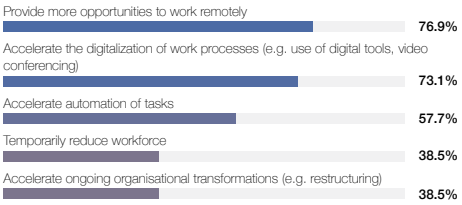
Skills identified as being in high demand within their organization, ordered by frequency

| | |
|---|---|
| 1. | Technology use, monitoring and control |
| 2. | Critical thinking and analysis |
| 3. | Active learning and learning strategies |
| 4. | Leadership and social influence |
| 5. | Analytical thinking and innovation |
| 6. | Reasoning, problem-solving and ideation |
| 7. | Complex problem-solving |
| 8. | Service orientation |
| 9. | Resilience, stress tolerance and flexibility |
| 10. | Technology design and programming |
| 11. | Troubleshooting and user experience |
| 12. | Systems analysis and evaluation |
| 13. | Coordination and time management |
| 14. | Quality control and safety awareness |
| 15. | Attention to detail, trustworthiness |

4

### Impact of COVID-19 on companies' strategy

Share of companies surveyed looking to adopt this strategy as a result of COVID-19




5

### Emerging and redundant jobs roles

Role identified as being in high demand or increasingly redundant within their organization, ordered by frequency

EMERGING

| | |
|---|---|
| 1. | Business Development Professionals |
| 2. | Software and Applications Developers |
| 3. | Sales Representatives, Wholesale and Manufacturing, Technic… |
| 4. | Robotics Engineers |
| 5. | Internet of Things Specialists |
| 6. | Data Analysts and Scientists |
| 7. | Project Managers |
| 8. | Power Production Plant Operators |
| 9. | Assembly and Factory Workers |
| 10. | AI and Machine Learning Specialists |

REDUNDANT

| | |
|---|---|
| 1. | Assembly and Factory Workers |
| 2. | Relationship Managers |
| 3. | Business Services and Administration Managers |
| 4. | Sales Representatives, Wholesale and Manufacturing, Technic… |
| 5. | Administrative and Executive Secretaries |
| 6. | General and Operations Managers |
| 7. | Door-To-Door Sales Workers, News and Street Vendors, and R… |
| 8. | Data Entry Clerks |
| 9. | Accounting, Bookkeeping and Payroll Clerks |
| 10. | Accountants and Auditors |

Industry Profile



# Advanced Manufacturing

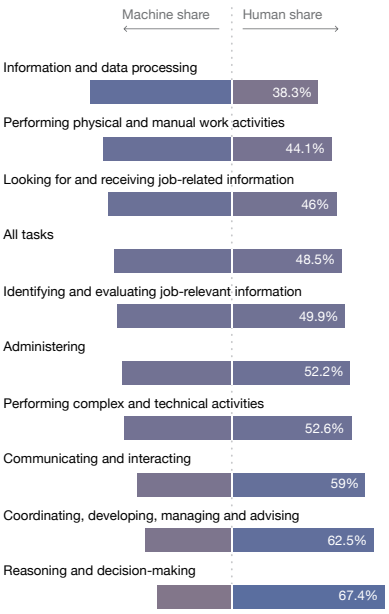
6

## Barriers to adoption of new technologies

Share of companies surveyed

8

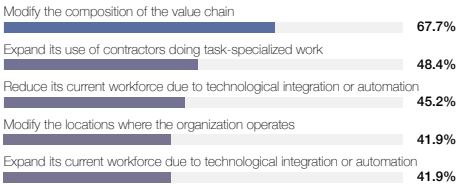
## Augmentation of key job tasks by 2024




7

## Expected impact on workforce

Share of companies surveyed




9

## Current skills in focus of existing reskilling/upskilling programmes

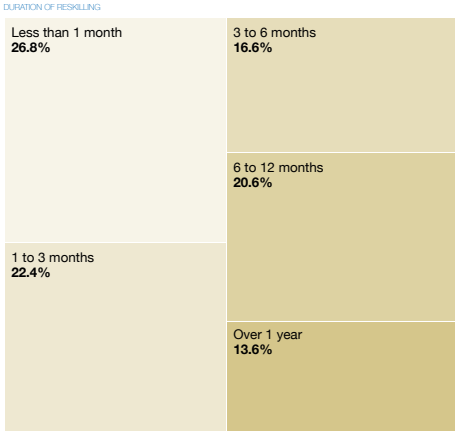
Share of companies surveyed identifying this skill as being in focus across their reskilling or upskilling programs

| | |
|---|---|
| 1. | Technology use, monitoring and control |
| 2. | Analytical thinking and innovation |
| 3. | Complex problem-solving |
| 4. | Technology installation and maintenance |
| 5. | Critical thinking and analysis |
| 6. | Technology design and programming |
| 7. | Quality control and safety awareness |
| 8. | Service orientation |
| 9. | Management of financial, material resources |
| 10. | Leadership and social influence |

10

## Average reskilling needs

Share of workforce within this industry



## 1. Average share of displaced workers / Expected redeployment success rate of displaced workers / Average skills instability among workforce

The share of workers at risk of displacement was calculated by computing the mean response of surveyed employers operating in this industry to the Future of Jobs Survey question: "What proportion of your global workforce do these employees which are likely to become increasingly redundant in your organization represent in the next four years?"

The expected redeployment success rate was calculated by computing the mean response from surveyed employers from this industry to the Future of Jobs Survey question "What percentage of employees with increasingly redundant skillsets do you expect to successfully redeploy within your organization after they have completed their reskilling programme?"

The average skills instability among the workforce was calculated by computing the mean response from surveyed employers from this industry to the Future of Jobs Survey question "Keeping in mind the tasks that will be performed by your employees, in the next four years what proportion of the core skills required to perform their roles well will be different".

**Period**: 2020.
**Source**: World Economic Forum, Future of Jobs Survey 2020.

## 2. Technology adoption in industry:

This bar chart represents the share of survey respondents from companies operating in the industry who indicated that, by 2025, their company was "likely" or "very likely" (on a 5-point scale) to have adopted the stated technology as part of its growth strategy by 2025. For a more detailed discussion of each technology, please refer to the "Technology adoption" section in chapter 2 of the report.

**Period**: 2020.
**Source**: World Economic Forum, Future of Jobs Survey 2020.

## 3. Emerging skills:

The table provides the list of skills the industry respondents have selected as being increasingly important within their organization. It is based on the responses to the following question "Keeping in mind the tasks that will be performed by the key roles in your organization, in the next four years would you expect an increase or decrease in the use of the following skills by individuals?" from the Future of Jobs Survey. The skills are ranked by frequency and ranked from 1 to 15. The full list of skills is based on the O*NET classification and available in the appendix section of this report.

**Period**: 2020.
**Source**: World Economic Forum, Future of Jobs Survey 2020.

## 4. Impact of Covid-19 on companies' strategy:

This bar chart shows the top 5 measures organizations are planning on implementing in response to the current COVID-19 outbreak as a share of survey respondents from the industry. It is based on the responses to the following question "In response to the current outbreak, which of the following measures has your company implemented or is planning to implement across the Organization?" from the Future of Jobs Survey.

**Period**: 2020.
**Source**: World Economic Forum, Future of Jobs Survey 2020.

## 5. Emerging and redundant job roles:

This table provides an overview of job roles expected to experience an increase and decrease in demand within this industry over the 2020–2025 period. The individual job roles listed are for illustrative purposes and report the job roles most frequently cited by survey respondents from companies operating in the industry. Categorization of job roles is adapted from the O*NET labour market information system (please see Appendix A: Report Methodology for details).

**Period**: 2020.
**Source**: World Economic Forum, Future of Jobs Survey 2020.

## 6. Barriers to adoption of new technologies:

This bar chart shows the most common barriers companies face when adopting new technologies.

It is based on the responses to the following multiple-choice question “What are the top economic and social barriers your organization experiences when introducing new technologies?” from the Future of Jobs Survey. This bar is ranked by frequency of responses by companies surveyed from this industry.

**Period**: 2020.
**Source**: World Economic Forum, Future of Jobs Survey 2020.

## 7. Expected impact on workforce:

This bar chart shows the expected impact of the current growth strategy of companies operating in this industry on their workforce in the next four years. It is based on the responses to the following multiple-choice question “To deliver on your organization’s current growth strategy in the next four years, your organization would need to?” from the Future of Jobs Survey.

**Period**: 2020.
**Source**: World Economic Forum, Future of Jobs Survey 2020.

## 8. Augmentation of key job tasks by 2024:

The bar chart depicts the share of time that will be performed by humans compared to machines by 2024 for each task. It is based on the responses to the following question “Currently, what proportion of time spent doing tasks in your organization is spent by your employees performing the work?” from the Future of Jobs Survey. This stacked bar chart is ranked by share of time spent doing tasks by machines.

**Period**: 2020.
**Source**: World Economic Forum, Future of Jobs Survey 2020.

## 9. Current skills in focus of existing reskilling/upskilling programmes:

The table provides the list of skills that are the focus of existing industry company reskilling/upskilling programmes. It is based on the responses to the following question “Keeping in mind your current strategic direction, select the top 10 skill clusters that you are currently focusing your reskilling/upskilling efforts on?” from the Future of Jobs Survey. The skills are ranked from 1 to 10 by frequency of responses by companies surveyed from this industry, with 1 being the skill for which most organzations offer training. The full list of skills is based on the O*NET classification and available in the appendix section of this report.

**Period**: 2020.
**Source**: World Economic Forum, Future of Jobs Survey 2020.

## 10. Average reskilling needs:

The treemap shows the estimated time needed to reskill each share of the workforce that needs reskilling within the industry. It is based on the responses to the following question “Bearing in mind the evolving skill demand, how long do you expect the reskilling/upskilling of your employees to take?” from the Future of Jobs Survey. Respondents were asked to provide as share of their workforce for each duration of reskilling/upskilling.

**Period**: 2020.
**Source**: World Economic Forum, Future of Jobs Survey 2020.

# Country Profiles

# Industry Profiles

# Appendix A: Report Methodology

The *Future of Jobs Report* is based on the results of the 2020 edition of the Future of Jobs survey, a unique source of information that gathers the insights from the largest companies worldwide on the changing nature of work.

The survey asks senior executives to share the planning for their companies' workforce transformation with a time horizon up to 2024. It aims to provide timely and unique insights on the trends affecting the labour market, the rate of technological adoption among firms, the shifting job landscape and associated changes to skills needs as well as business planning for appropriate upskilling and reskilling.

The 2020 survey dissemination took place during the first half of 2020. The survey provides a much-needed compass for business, governments, civil society Organizations as well as the public at large on the short-and medium-term transformations to the labour market.

## Survey design

The survey builds on the methodology from the 2016 and 2018 survey editions. Following survey best practice and in consultation with the World Economic Forum Global Future Council on the new Education and Work Agenda, several questions were refined and new questions were added. The three core concepts that are key to the construction of the Future of Jobs Survey remain unchanged in this edition. That is, the nature of work is broken down into three interrelated subcategories: job roles, tasks and skills. Task are defined as the actions necessary to turn a set of inputs into valuable outputs. A collection of tasks forms the content of job roles, while skills are capabilities needed to be able to perform the tasks well.

The survey is structured into four parts. The first part includes questions on the expected transformations to the workforce, including the major trends that are affecting the labour market and the technologies that are being adopted. The second part focuses on jobs, skills and tasks and how these are expected to evolve over a four-year period. The third part collects information on training programmes and employee reskilling needs and efforts. Finally, to understand the shorter-term impacts of the global pandemic, a fourth section was added on the effects of the COVID-19 on the workforce.

The survey consists of quantitative as well as qualitative questions seeking to capture the strategic knowledge, projections and planning of the respondents. The study is designed to reveal the world's leading employers' estimates on how the labour force is transforming, their projections on how quickly these shifts will happen, and their efforts in addressing these changes.

In total the survey comprises 49 questions and was made available in four languages: English, Spanish, Japanese and Russian.

## Survey distribution

The survey was distributed via an online platform through three dissemination networks. The primary distribution route was to the World Economic Forum partners and constituents in collaboration with the World Economic Forum Regional and Industry teams. The survey was further disseminated through a network of Partner Institutes—local partner organizations that administered the survey in their respective economies. Further dissemination through partner organizations enabled the strengthening of regional representation by extending the sample to local companies. As a third dissemination channel, the New Economy and Society team shared the survey with the collaborators from the countries in which the Closing the Skills and Innovation Gap Accelerators are present (South Africa, UAE, Bahrain, India, Pakistan). The Accelerator project brings about tangible change by building a national public-private collaboration platform to increase employability of the current workforce and increase work-readiness and critical skills among the future workforce.

For the full overview of the survey partners, please refer to the Survey Partners and Acknowledgements sections at the end of the report.

The network of survey partners responsible for the dissemination followed clear sampling guidelines, which specified the level of the respondent, the target companies and the sample composition. As the questions in the survey require deep insight into an organization's current strategy as well as talent-related aspects of operationalizing this strategy, the target respondents were senior executives in charge of human resources, strategy and innovation departments.

The target companies were specified as the largest multinational and national companies, significant in terms of revenue or employee size. The threshold was set at companies with 100 employees or more as questions concerning technology absorption and its consequential impact on employee planning are most relevant for larger companies with a significant share of employment.

Finally, the guidelines specified the industry representation, which should reflect the structure of the economy by industry in proportion to the share of GDP (see Table A1), while also ensuring good geographical coverage.

The data was collected over a nine-month period from January to September 2020. In late February, the survey was updated to reflect the new global context. A specific section with questions relating directly to the COVID-19 health crisis and its implications for the workforce was included.

By 23 March, when most economies were experiencing the effects of the pandemic and had started to implement measures to slow the spread of the virus, only 24% of the Future of Jobs Surveys had been completed. By mid-April, by which time most economies were in full or partial lockdown (see Figure 2), 36% of companies had completed the survey. Therefore, most of the responses were collected during the COVID-19 pandemic while at least partial lockdown measures were in place, and therefore captured some of the impact of COVID-19 on the organization's workforce planning. Nevertheless, results should be interpreted with caution as companies might not have been fully aware of the implications of their health crisis on their workforce during the early phases of the pandemic.

## Representativeness

With the purpose to represent the planning and projections of global business, 65% of the final sample is composed of multinational companies, while 35% is from larger local companies, significant in terms of revenue or size. The final sample includes responses from Chief Executive Officers (12%), top executives (59%), middle-level executives (25%), and, in exceptional cases, other respondents such as consultants (3%).

Over half of the final sample (52%) is composed of respondents from Human Resources departments, responsible for the planning of the company's employees. Other responses represent the views of executives from the organization's strategic departments, including Finance, Operation and Strategy.

After applying the representative criteria, the final sample comprised 15 industry clusters and 26 countries which collectively represent 80% of the world GDP. The industries represented are: Professional Services; Manufacturing; Digital Communications and Information Technology; Financial Services; Consumer; Mining and Metals; Education; Government and Public Sector; Health and Healthcare; Automotive; Agriculture, Food and Beverage; Transportation and Storage; Energy Utilities and Technologies; Oil and Gas and Advanced Manufacturing. The countries represented are the United States, the United Kingdom, the United Arab Emirates, China, Germany, India, Saudi Arabia, Poland, the Russian Federation, Japan, France, Thailand, Australia, Brazil, Canada, the Netherlands, Singapore, Spain, Pakistan, Mexico, Switzerland, Argentina, Indonesia, Italy, South Africa and Malaysia.

In total, the report's data set contains 291 unique responses by global companies, collectively representing more than 7.7 million employees worldwide. Out of scope of this report are responses from small companies with fewer than 100 employees as well as responses from the informal sector.

The report aims to provide guidance and stimulating discussion. However, the results should be treated with caution when looking to generalize its findings in a manner that could be considered representative of all trends across an entire industry or country.

## Classification framework for jobs and skills

Following the 2016 and 2018 taxonomy, this year's report employed the Occupational Information Network (O*NET) framework for its categories of analysis for jobs, skills and tasks. O*NET was developed by the US Department of Labor in collaboration with its Bureau of Labor Statistics' Standard Classification of Occupations (SOC) and remains the most extensive and respected classification of its kind. In its unabridged form, the O*NET-SOC taxonomy includes detailed information on 974 individual occupations in the United States, grouped into approximately 20 broader job families, which are regularly revised and updated for new and emerging occupations to keep up with the changing occupational landscape.

The Generalized Work Activities segment of the O*NET methodology was used to form the list of tasks used in the survey. In addition, for the classification of skills, the report team employed an abridged version of the "Worker Characteristics" and Worker Requirement classifications; in particular, bundles 1.A., 1.C., 2.A., and 2.B. Additional details about the composition of the skills list used in this report can be found in Table A2.

The list of roles used in the report is enhanced with roles which were consistently added to previous editions of the report. In addition, the skills taxonomy used is an adapted and enhanced version of the O*NET taxonomy, enriched by feedback and insights from New Metrics collaborators. For details please see Tables A2 and A3.

TABLE A1 | **Taxonomy of industry categories**

| Industry cluster | Industry | Alternative names |
|---|---|---|
| Agriculture, Food and Beverage | Agriculture, Forestry, Fishing and Hunting | |
| Agriculture, Food and Beverage | Food and Beverages | |
| Automotive | Automotive | |
| Consumer | Accomodation and Food Services | Retail, Consumer Goods and Lifestyle |
| Consumer | Restaurants | Retail, Consumer Goods and Lifestyle |
| Consumer | Retail / Retail Trade | Retail, Consumer Goods and Lifestyle |
| Digital Communications and Information Technology | Telecommunications | |
| Digital Communications and Information Technology | Information Technology | |
| Digital Communications and Information Technology | Electronics | |
| Education | Education Management | |
| Education | Education Services | |
| Education | Higher Education | |
| Energy Utilities & Technologies | Energy Utilities | Utilities |
| Energy Utilities & Technologies | Energy Technology | |
| Financial Services | Banking and Capital Markets | Banking |
| Financial Services | Insurance and Asset Management | Financial Services and Insurance / Finance and Insurance |
| Financial Services | Institutional Investors | Financial Services and Insurance / Finance and Insurance |
| Financial Services | Private Investors | Financial Services and Insurance / Finance and Insurance |
| Government and Public Sector | Government and Public Sector | Public Administration / Government Administration |
| Government and Public Sector | Non-Profits | Non-Profit Organization Management |
| Health and Healthcare | - | Health Care and Social Assistance / Hospital & Health care |
| Information Technology | - | Information Technology & Services |
| Infra, Urban Dev. & Real Estate | Construction | |
| Infra, Urban Dev. & Real Estate | Real Estate, Rental and Leasing | |
| Manufacturing | Advanced Manufacturing | |
| Manufacturing | Aerospace | |
| Manufacturing | Chemical and Advanced Materials | |
| Media, Entertainment & Culture | Arts, Entertainment and Recreation | |
| Media, Entertainment & Culture | Marketing and Advertising | |
| Media, Entertainment & Culture | Information and Media | |
| Military | - | |
| Mining and Metals | Mining and Metals | Mining, Quarrying, and Oil and Gas Extraction |
| Office and Facilities Support Services | Administrative and Support and Waste Management and Remediation Services | |
| Oil and Gas | Oil and Gas | Mining, Quarrying, and Oil and Gas Extraction |
| Oil and Gas | Oil Field Services and Equipment | Mining, Quarrying, and Oil and Gas Extraction |
| Other Services | Other Services | |
| Professional Services | Administrative and Support Services | |
| Professional Services | Management of Companies and Enterprises | |
| Professional Services | Professional, Scientific and Technical Services | |
| Supply Chain & Transportation | Transportation and Warehousing | |
| Supply Chain & Transportation | Wholesale Trade | |
| Transportation and Storage | Aviation, Travel and Tourism | |
| Transportation and Storage | Supply Chain and Transportation | |

Source

World Economic Forum.

| Competency bundle | Competency | Description |
|---|---|---|
| Active learning and learning strategies | Active learning | Understanding the implications of new information for both current and future problem-solving and decision-making. |
| | Learning strategies | Selecting and using training/instructional methods and procedures appropriate for the situation when learning or teaching new things. |
| Analytical thinking and innovation | Analytical thinking | Job requires analyzing information and using logic to address work-related issues and problems. |
| | Innovation | Job requires creativity and alternative thinking to develop new ideas for and answers to work-related problems. |
| Attention to detail, trustworthiness | Attention to detail | Job requires being careful about detail and thorough in completing work tasks. |
| | Dependability | Job requires being reliable, responsible and dependable, and fulfilling obligations. |
| | Integrity | Job requires being honest and ethical. |
| Complex problem-solving | Complex problem-solving | Identifying complex problems and reviewing related information to develop and evaluate options and implement solutions. |
| Coordination and time management | Time management | Managing one's own time and the time of others. |
| | Coordination | Adjusting actions in relation to others' actions. |
| Creativity, originality and initiative | Initiative | Job requires a willingness to take on responsibilities and challenges. |
| Critical thinking and analysis | Critical thinking | Using logic and reasoning to identify the strengths and weaknesses of alternative solutions, conclusions or approaches to problems. |
| | Monitoring | Monitoring/assessing performance of yourself, other individuals, or organizations to make improvements or take corrective action. |
| Emotional intelligence | Concern for others | Job requires being sensitive to others' needs and feelings and being understanding and helpful on the job. |
| | Cooperation | Job requires being pleasant with others on the job and displaying a good-natured, cooperative attitude. |
| | Social orientation | Job requires preferring to work with others rather than alone, and being personally connected with others on the job. |
| | Social perceptiveness | Being aware of others' reactions and understanding why they react as they do. |
| Instruction, mentoring and teaching | Instructing | Teaching others how to do something. |
| Leadership and social influence | Leadership | Job requires a willingness to lead, take charge and offer opinions and direction. |
| Management of financial, material resources | Management of financial resources | Determining how money will be spent to get the work done, and accounting for these expenditures. |
| | Management of material resources | Obtaining and seeing to the appropriate use of equipment, facilities and materials needed to do certain work. |
| Management of personnel | Management of personnel resources | Motivating, developing and directing people as they work, identifying the best people for the job. |
| Manual dexterity, endurance and precision | Endurance | The ability to exert oneself physically over long periods without getting out of breath. |
| | Flexibility, balance and coordination | Abilities related to the control of gross body movements. |
| | Physical strength abilities | Abilities related to the capacity to exert force. |
| | Control movement abilities | Abilities related to the control and manipulation of objects in time and space |
| | Fine manipulative abilities | Abilities related to the manipulation of objects. |
| | Reaction time and speed abilities | Abilities related to speed of manipulation of objects. |
| Memory, verbal, auditory and spatial abilities | Attentiveness | Abilities related to application of attention. |
| | Memory | Abilities related to the recall of available information. |
| | Perceptual abilities | Abilities related to the acquisition and organization of visual information. |
| | Spatial abilities | Abilities related to the manipulation and organization of spatial information |
| | Verbal abilities | Abilities that influence the acquisition and application of verbal information in problem-solving. |
| Persuasion and negotiation | Negotiation | Bringing others together and trying to reconcile differences. |
| | Persuasion | Persuading others to change their minds or behaviour. |
| Quality control and safety awareness | Quality control analysis | Conducting tests and inspections of products, services or processes to evaluate quality or performance. |
| Reading, writing, math and active listening | Active listening | Giving full attention to what other people are saying, taking time to understand the points being made, asking questions as appropriate, and not interrupting at inappropriate times. |

| Competency bundle | Competency | Description |
|---|---|---|
| | Mathematics | Using mathematics to solve problems. |
| | Reading comprehension | Understanding written sentences and paragraphs in work related documents. |
| | Science | Using scientific rules and methods to solve problems. |
| | Speaking | Talking to others to convey information effectively |
| | Writing | Communicating effectively in writing as appropriate for the needs of the audience. |
| Reasoning, problem-solving and ideation | Idea generation and reasoning abilities | Abilities that influence the application and manipulation of information in problem-solving. |
| | Quantitative abilities | Abilities that influence the solution of problems involving mathematical relationships. |
| Resilience, stress tolerance and flexibility | Adaptability/flexibility | Job requires being open to change (positive or negative) and to considerable variety in the workplace. |
| | Self control | Job requires maintaining composure, keeping emotions in check, controlling anger and avoiding aggressive behavior, even in very difficult situations. |
| | Stress tolerance | Job requires accepting criticism and dealing calmly and effectively with high stress situations. |
| Service orientation | Service orientation | Actively looking for ways to help people. |
| Systems analysis and evaluation | Judgment and decision-making | Considering the relative costs and benefits of potential actions to choose the most appropriate one. |
| | Systems analysis | Determining how a system should work and how changes in conditions, operations and the environment will affect outcomes. |
| | Systems evaluation | Identifying measures or indicators of system performance and the actions needed to improve or correct performance, relative to the goals of the system. |
| Technology design and programming | Programming | Writing computer programmes for various purposes. |
| | Technology design | Generating or adapting equipment and technology to serve user needs. |
| Technology installation and maintenance | Equipment maintenance | Performing routine maintenance on equipment and determining when and what kind of maintenance is needed. |
| | Installation | Installing equipment, machines, wiring or programmes to meet specifications. |
| | Repairing | Repairing machines or systems using the needed tools. |
| Technology use, monitoring and control | Equipment selection | Determining the kind of tools and equipment needed to do a job. |
| | Operation and control | Controlling operations of equipment or systems. |
| | Operation monitoring | Watching gauges, dials or other indicators to make sure a machine is working properly. |
| | Operations analysis | Analyzing needs and product requirements to create a design. |
| Troubleshooting and user experience | Troubleshooting | Determining causes of operating errors and deciding what to do about them. |
| Visual, auditory and speech abilities | Auditory and speech abilities | Abilities related to auditory and oral input. |
| | Visual abilities | Abilities related to visual sensory input. |

Source

World Economic Forum.

| Competency type | Taxonomy cluster level 1 | Taxonomy cluster level 2 | Taxonomy cluster level 3 | Taxonomy cluster level 3 definition |
|---|---|---|---|---|
| **Skills and knowledge**: Skills are the capabilities needed to complete a task, and therefore a job.<br>Knowledge is the body of facts, principles and theories that are related to a field of work or study and can be further split into dependent knowledge (practical and procedural) and context-independent or theoretical knowledge. | Business skills | Management and communication of activities | Coordination and time management | Capacity to manage one's time and planning in tandem with others. |
| | | | Management of financial, material resources | Developed capacities for gathering resources to achieve tasks including how money will be spent to get the work done, obtaining equipment, facilities, and materials and accounting for expenditures. |
| | | | Sales, communication and marketing of products and services | Developed capacities to identify and shape effective value propositions for products and services, as well as to sell products on that basis. |
| | | | Quality control and safety awareness | Conducting tests and inspections of products, services or processes to evaluate quality and level of performance. |
| | Innovation and creativity | Problem-solving | Analyticial thinking and originality[3] | Capacity to analyze information and use logic to address issues and problems, apply alternative thinking to develop new, original ideas and answers. |
| | | | Analyticial thinking and originality[3] | Capacity to solve novel, ill-defined problems in complex, real-world settings. |
| | | | Complex problem-solving | Abilities that influence the acquisition and application of knowledge in problem-solving. |
| | | | Systems analysis and evaluation | Capacities used to understand, monitor and improve socio-technical systems. |
| | | | Critical thinking and analysis | Using logic and reasoning to identify the strengths and weaknesses of alternative solutions, conclusions or approaches to problems as well as assessing performance of yourself, other individuals or organizations to make improvements or take corrective action. |
| | Digital | Technology use and development | Creating and maintaining technology[5] | Capacity to use programming to design machines or technological systems which fit user needs. In addition, understanding how others use tools, determine the cause of operating errors and how to fix them.<br><br>Skills include:<br>- Artificial Intelligence<br>- Computer Hardware & Networking Systems<br>- Cybersecurity and Application Security<br>- Data Science and Analysis<br>- Human Computer Interaction<br>- Scrum/Agile Product Development<br>- Software & Programming<br>- Technical Support and Maintenance<br>- Web Development |
| | | | Using and operating technology[6] | Capacity to select the right tools needed to perform tasks, use those tools well and set up and operate technology.<br>Skills include:<br>- Accounting and Finance Software<br>- Construction Management Software<br>- Clininal Information Systems<br>- Digital Design<br>- Digital Literacy<br>- Digital Marketing<br>- Geographic Information Systems<br>- Human Resourse Management Systems<br>- Productivity Software<br>- Machining & Manufacturing Technologies<br>- Scientific Computing |
| | Industry-specialized | | | Skills specific to certain fields or professions: Documentation in Cloud Computing, Video and Editing in Marketing, Sales and Content or Radiation Oncology (in the Care Economy professional cluster). The cluster excludes skills related to the operation and design of digital technologies. |

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