McKinsey & Company

The Future of Work in Croatia

Croatia's Talent Transformation in the Era of Digitalization and Automation

Prepared by McKinsey & Company Adriatic in cooperation with the McKinsey Global Institute

The Future of Work in Croatia

Croatia's Talent Transformation in the Era of Digitalization and Automation

Contents

Executive summary

Digital technologies, artificial intelligence (AI), and automation are changing the way people live and work. These technologies already play a prominent role in today's world, and will continue to do so in the future—with profound implications for the future of work.

McKinsey & Company has focused on future-of-work issues over the past decade and is dedicated to serving clients on this topic. In addition, the McKinsey Global Institute (MGI), the business and economics research arm of McKinsey, has studied the effects of automation on workforces and skills since 2015. MGI considers the adoption of digital technologies as one of the most important factors in future economic growth.

Based on analysis, insights from MGI, and consultation with multiple stakeholders, the report examines the impact of automation, AI, and digital technologies on different sectors and occupations and the implications for the mix of skills the Croatian workforce is likely to need by 2030. It also addresses the opportunities that may emerge and the challenges that must be overcome in coming decade.

Croatia was in a recession from 2009 to 2015, but has slowly recovered. In recent years, Croatia has made important steps in strengthening its economic resilience by improving its fiscal position and its product and labour market regulations.[1] However, Croatia's GDP per capita is still among the lowest in the EU. This gap is mainly driven by lower productivity and lower levels of investment than in other EU countries. Croatia needs to boost productivity to enable the kind of sustainable economic growth that spreads income growth across the population, especially given the country's ageing population. It is imperative to address future-of-work issues—particularly automation, digitalization, and workforce skills changes—to unlock this economic growth.

Up to €8.3

billion can be created by Croatia's digital economy by 2025

There is an opportunity for Croatia to embrace automation in the national interest. Supported by appropriate policies, and investment in skills development, businesses can develop new services and products, boost productivity and create new and better-paying jobs. By adapting to the changes in the nature of work over the coming decade, Croatia can avoid unemployment and create national wealth that can promote social inclusion.

Accelerated digitalization could be a key new driver of growth. Croatia's digital economy, encompassing all digital activities in all sectors of the economy, currently accounts for roughly 5 percent of GDP, equivalent to €2.4 billion. By 2025, Croatia's digital economy could account for as much as 11 percent of GDP, contributing up to €8.3 billion to the economy[2].

While automation and digitalization bring opportunities for building a productive and competitive Croatian workforce, they also pose challenges—particularly around job displacement and future skills. As is the case in other EU countries, all Croatian stakeholders must seek to balance the pace of automation and reskilling if the country is to reap the benefits of automation and new technologies. If automation and digitalization happen too fast, there is a possibility that the new jobs they create might go unfilled. This could potentially result in worsening income inequality. On the other hand, if automation and digitalization happen too slowly, there is a possibility that Croatia's competitiveness and economic growth could suffer.

[1] Boosting Croatia's Economic Resilience, The World Bank, June 2020, worldbank.org.
[2] Croatia – Emerging digital challenger: Digitalization as the new growth engine for Croatia," McKinsey & Company, November 2018.

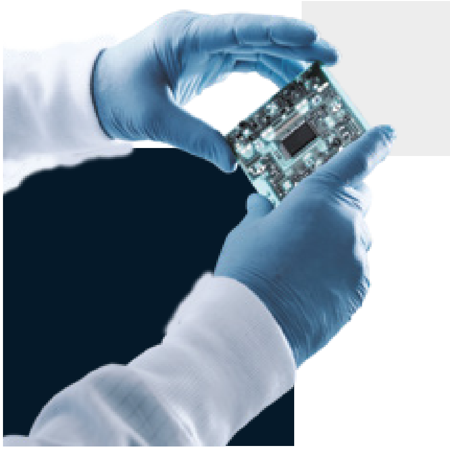
Over the coming decade, we expect that the nature of work in Croatia will be reshaped by several long-term macroeconomic trends such as rising incomes, an ageing population, infrastructure investment, rising education levels, increased technology spend and adoption, increased energy efficiency, and marketization of unpaid work. This report also tries to take into account recent changes brought about by the COVID-19 pandemic. While COVID-19 is a recent phenomenon, and its effects may fade over the coming decade, it has accelerated certain trends which have an impact on the long-term view. For instance, changes in consumer behavior, and corresponding shifts in business models, have reshaped the structure of many industries. The accelerated rise in e-commerce, greater use of digital channels, and reduced business travel in favor of videoconferencing are all pandemic-related trends enabled by digital technology. There has also been an increase in the use of robotics and AI in a few industries, an increase in remote work across many industries, and a greater use of contract and freelance workers. Taken together, these trends will shape where and how people work, and influence the number and mix of jobs available. Croatia has potential to capitalize on these trends and improve productivity, and prosperity, across its economy.

The analyses in this report take into account the workforce composition across the country, combined with the anticipated rate of automation adoption based on the technology available and the economic feasibility of implementing it. Factoring in accelerated automation owing to COVID-19 trends, Croatia is expected to have an automation adoption rate of 22 percent by 2030. Automation adoption will vary by sector—manufacturing, wholesale trade and the administrative support and government sectors are expected to see the highest levels of automation.

Overall, jobs displaced by automation and COVID-19 trends are expected to be offset by the creation of new jobs and new occupations over the next decade. While roughly 340,000 jobs are likely to be displaced, these are expected to be offset by the creation of approximately 340,000 new jobs and occupations as industries grow, productivity increases, and new occupations are invented. However, this will not happen on its own—all private organizations, public institutions, and educational institutions will have to work together during this transition to ensure that this potential is realized.

Net labour demand is expected to remain unchanged, but all workers could be affected by this transformation. In fact, up to 140,000 Croatian workers may have to switch occupations by 2030 to remain employed. It will be critical for all stakeholders to collaborate in finding ways to equip the Croatian workforce with the skills needed to make this transition.

By 2030, 6 percent of total working hours could shift from performing tasks that require physical skills to those that require cognitive, socio-emotional, and technological skills. Specific skills such as those needed for operating equipment or basic data input and processing will likely see the greatest decline in employment share by 2030. This is expected, as predictable physical activities and data-collection and processing activities are highly automatable. Overall, the share of time spent on higher cognitive skills will likely remain unchanged, although specific skills within this category may see shifts in demand. For instance, critical thinking and decision making stand out as skills most likely to be needed in the future. The demand for all socio-emotional skills will increase—interpersonal skills and empathy, in particular. There will also be an increase in demand for most types of technological skills.



With foresight and a commitment to act, Croatia can capture the opportunity offered by automation, manage the risks, and ensure that the gains are broadly shared. The national effort could include strong mechanisms to coordinate action. Companies and public institutions could embark on strategic workforce planning to assess talent gaps and build a future-fit workforce. Companies can also take steps to assist displaced workers, complementing government efforts to protect the most vulnerable and promote inclusive economic growth. Educational institutions can collaborate with other stakeholders to set out guidelines and frameworks for how to empower existing workers with new skills, and update existing training and educational models to address known skills gaps.

Key messages

1. **Automation is here to stay.** Globally, companies are expanding their use of digital technologies and increasing automation. For instance, many companies are shifting customer journeys, employee experiences, and internal processes to digital channels—greatly accelerating processes from days to minutes, reducing costs by over 30 percent, and improving quality control. Automation technology, including robotic process automation and machine learning, is helping companies to enhance user experience, increase operational flexibility and productivity, and gain deeper insight through the ability to analyze thousands of data points.

   Recently, COVID-19 has accelerated the adoption of automation and digitalization across the world. McKinsey's 2020 Global Business Executive Survey, conducted with 800 executives across a range of companies, indicated that during the pandemic 68 percent of these organizations accelerated the adoption of automation or AI.

   There is widespread concern that increased use of technologies such as machine learning, AI, and automation will destroy jobs. However, while technology is disruptive, it has the potential to create new jobs and new occupations and contribute to increased productivity and economic growth.

68%

of organizations adopted automation or AI during COVID-19 pandemic

2. **More than half of working hours in Croatia are currently spent on activities that are highly susceptible to automation.** Based on an analysis of 820 occupations and 2,100 work activities across 17 sectors, this report finds that activities such as collecting and processing data and performing predictable physical tasks are the most susceptible to automation. These repetitive activities currently account for approximately 54 percent of work time and have a combined average technical-automation potential of roughly 69 percent. Conversely, activities that require human interaction, people management, and expertise are less susceptible to automation.

Overall, Croatia's automation potential is one of the highest in Europe. Approximately 49 percent of work hours have the potential to be automated. However, even if certain skills or occupations have high automation potential, this does not mean that organizations will adopt the technology necessary to implement it. Automation is unlikely to reach this level, or be implemented at a rapid rate over the next ten years. A more likely scenario is that Croatia could see 22 percent of work hours actually automated by 2030.

Manufacturing, wholesale trade, and the accommodation and food-services sectors exhibit high automation potential. Taking a sectoral view, we see that Croatia's manufacturing sector exhibits the highest automation potential, at 63 percent. This is due to the sector's high share of repetitive and predictable physical work. Automation in manufacturing may have a profound impact on the future of work, as the sector has the highest share of employment, at 17 percent of Croatia's total employment in 2019.

Of the 17 sectors analyzed, wholesale trade and accommodation and food services also show high automation potential, both at 55 percent. This is possibly due to their reliance on performing predictable physical activities and collecting and processing data vw. Other industries and occupations which rely on a large percentage of work time being spent on data collection and processing are also highly susceptible to automation, such as office support and administrative occupations.

3. **Croatian jobs displaced by automation and COVID-19 trends are expected to be offset by new jobs.** By 2030, an estimated over 280,000 Croatian jobs may be lost to automation, and over 50,000 jobs may be lost owing to post-COVID-19 trends. However, these are likely to be offset by the creation of 240,000 jobs owing to macro-economic trends and gains in productivity through automation and digitalization. Additionally, another 97,000 jobs in new occupations that do not exist today are likely to appear over the next decade.

   While net labour demand is likely to remain unchanged, there will be significant shifts in labour demand within sectors.

4. **Anticipated labour demand varies across sectors.** The largest net declines in labour demand are likely to be seen in the administrative, support and government sectors, as well as in manufacturing and wholesale trade. Conversely, industries that rely on expertise or creativity—skills that are less likely to be automated—could see an increase in labour demand, most noticeably in the healthcare, arts, entertainment and recreation, and financial sectors. Accordingly, there could be an increase in demand for health professionals, STEM professionals, managers and educators. These country-wide trends may affect different counties in different ways, depending on the current skills mix of the workforce in each area.

5. **The workforce will need to acquire stronger socio-emotional and technological skills.** By 2030, time spent on activities that require physical and basic cognitive skills could shift towards activities that require socio-emotional and technological skills. Across all sectors, wide-scale labour reskilling may be necessary to meet future demand, and to prevent job loss and unemployment. Up to ~140.000 of those currently employed might need to be reskilled to stay employed or find a new employment. Reskilling efforts could be focused on the skills most likely to be needed in the future, particularly socio-emotional skills (including interpersonal skills, empathy, leadership, entrepreneurship, and initiative-taking), technological skills (such as basic digital skills, and advanced IT skills and programming), and higher cognitive skills (such as creativity, critical thinking, and decision making).

   Importantly, demand for undergraduate and postgraduate workers is expected to increase, and workers with high-school qualifications may need to be offered opportunities to retrain or upskill to meet new skills requirements.

6. **There is an opportunity for all Croatian stakeholders to collaborate in preparing for the changes the coming decade will bring.** An ecosystem approach that brings together businesses, policy makers, educators, and other stakeholders might prove more effective than isolated efforts at addressing workforce challenges. A closely coordinated, comprehensive response could help more workers make the job transitions ahead.

Each stakeholder has a role to play in Croatia's workforce transformation. Stakeholders can take the following actions:

Businesses and associations

- **Strategic workforce planning.** Companies could conduct strategic workforce planning to assess future needs and prepare a road map for talent transformation. Workforce planning is critical for identifying roles and skills that will be needed in the future, and for finding ways to develop or attract the right talent to fill these roles.
- **Talent-transformation programs.** Companies can acquire or develop the skills they need through different types of talent programs. These include hiring new talent, upskilling existing employees through in-house training programs or partnering with training institutions, collaborating with other stakeholders to redeploy employees, and forming public–private partnerships to address wider reskilling efforts.
- **New working models**. Companies may need to adopt more agile and efficient working models to take advantage of digitalization and automation.

Public institutions

- **Geographical and sectoral labour force planning.** Public institutions can bring a broad perspective to bear on macroeconomic trends, and collaborate with businesses and educational institutions to assess specific needs in specific areas. They can define a country-wide workforce plan, identify priority areas, and address regional differences to ensure that interventions are targeted for the workers that need them.
- **Centers of development and technology.** Public institutions could play a role in setting up centers of excellence, for example to further IT skills training.
- **Mechanisms and incentives.** Policy makers could consider ways to strengthen the social safety net to support people transitioning between jobs or facing significant wage cuts because of automation, for instance though income-support programs and training grants, or by offering companies incentives for redeployment and reskilling.

Educational institutions

- **Education and training models.** Educational institutions can collaborate with other stakeholders to set out guidelines and frameworks for how to empower existing workers with new skills. They can also update existing training and educational models to address known skills gaps.
- **Learning experience.** Educational institutions can improve the current learning experience and transform the traditional classroom model to become more personalized. The new learning experience can be built through collaboration with community centers and experts, using project-based learning and rapid prototyping, with a focus on problem-solving skills.
- **Lifelong learning.** Educational institutions have a role to play in making learning opportunities available for people at any stage of life or career. Reskilling initiatives could include collaborating with public institutions to provide vouchers for people to spend on education.

Individuals

- **Continuous learning and self-development**. Business leaders will need to provide learning and development opportunities to advance individual career paths, and upskill or retrain workers whose jobs may be displaced. Public and educational institutions need to ensure that appropriate programs are designed to upskill workers at all stages of their careers.
- **Social and technological skills**. Individuals must be given opportunities to focus on developing skills that will be in high demand in the future, particularly socio-emotional, technological, and higher cognitive skills.
- **Lifelong flexible career paths.** With the rise of the gig economy, many workers are turning to freelance work instead of traditional full-time employment. COVID-19 has accelerated this trend. Businesses and public institutions need to ensure that there is adequate support for these types of workers.

1 Introduction

Technology is changing the nature of work, where it is done, and the skills that are needed to do it. While technological advances may be disruptive, they have the potential to increase productivity and economic growth, and to create shared prosperity and better lives for all. For instance, advances in AI—particularly in machine learning and deep learning—have allowed machines to accomplish tasks that were previously thought to require human judgement. In fact, since 2010, machine performance has steadily increased to the point where it can exceed human performance in many activities. Machines now exhibit human cognitive functions such as perceiving, reasoning, learning, and problem solving. For example, in January 2020, an AI algorithm was reported to have outperformed six radiologists in reading mammograms to diagnose breast cancer.[3]

Globally, companies are expanding their use of digital technologies and increasing automation. Many companies are shifting customer journeys, employee experiences, and internal processes to digital channels—greatly accelerating processes from days to minutes, reducing costs by over 30 percent, and improving quality control. Automation technology, including robotic process automation and machine learning, is enabling companies to enhance user experience, increase operational flexibility and productivity, and gain deeper insight through the ability to analyze thousands of data points in real time, driving instant decision making.

There is widespread concern that increased use of technologies such as machine learning, AI, and automation will destroy jobs. However, while technology is disruptive, it has the potential to create new jobs and new occupations. As McKinsey research points out, history shows that technology has created large shifts in employment, but the increased productivity it ushers in generally creates more jobs than those it destroys. For example, the introduction of personal computers from the 1980s destroyed an estimated 3.5 million jobs in the USA (for instance, among typists), but created 19 million new jobs across the economy. However, the impact of technology on employment is likely to differ significantly between countries.[4]

COVID-19 has accelerated the adoption of automation and lead to greater digitalization. McKinsey's 2020 Global Business Executive Survey, conducted with 800 executives across a range of companies, indicated that during the pandemic 68 percent of these organizations accelerated the adoption of automation or AI, 85 percent digitized their employee interactions, 48 percent digitized their customer channels, and 35 percent digitized their supply chains (Exhibit 1).

---

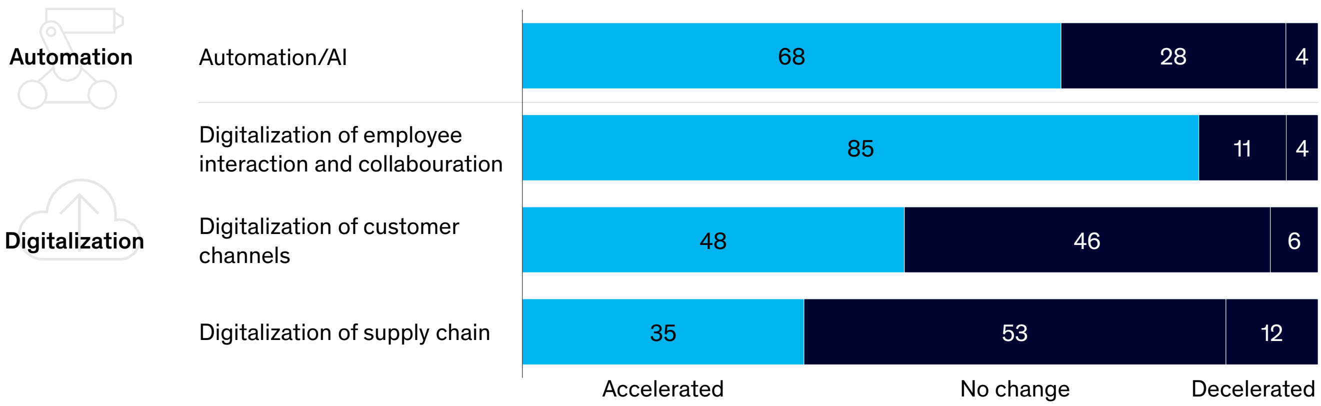
3 Fergus Walsh, "AI 'outperforms' doctors diagnosing breast cancer," BBC News, January 2, 2020, bbc.com.
4 "Jobs lost, jobs gained: Workforce transitions in a time of automation," McKinsey Global Institute, December 2017.

Exhibit 1

COVID-19 has accelerated automation and digitalization

Percentage of respondents, n = 800[1]

Since the start of the COVID-19 outbreak, how has your company's or business area's adoption of the following technology trends changed?



[1] Excludes 6 respondents who selected the option "Not applicable; we have not yet adopted this trend"

Source: McKinsey Global Business Executive Survey, July 2020, McKinsey Global Institute analysis

The pandemic has also accelerated changes in consumer behavior, and corresponding shifts in business models, and has reshaped the structure of many industries. For instance, the accelerated rise in e-commerce, greater use of digital channels, and reduced business travel in favor of videoconferencing are all pandemic-related trends enabled by digital technology. There has also been an increase in the use of robotics and AI, an increase in remote work, and greater use of contract and freelance workers. Furthermore, the trend toward greater market consolidation, and a decline in small and medium-sized businesses, together with shifts in global value chains, are reshaping industries.

Over the coming decade, the nature of work is expected to be reshaped by several long-term macroeconomic trends—such as rising incomes, ageing populations, infrastructure investment, rising education levels, increased energy efficiency, and marketization of unpaid work—as well as changes owing to COVID-19. Taken together, these trends will shape where and how people work, and influence the number and mix of jobs available.

Croatia has the potential to capitalize on these trends and improve productivity, and prosperity, across its economy. Croatian GDP grew by 21.6 percent from 2015 to 2019.[5] However, Croatia's GDP per capita is still among the lowest in the EU. This gap is mainly driven by lower productivity and lower levels of investment, indicating that Croatia has the potential to substantially improve productivity and unlock economic growth.[6]

[5] Croatian Bureau of Statistics, October 2020, dzs.hr.

[6] "Croatia – Emerging digital challenger: Digitalization as the new growth engine for Croatia," McKinsey & Company, November 2018.

Additionally, many Croatian sectors have significant digitalization gaps that need to be closed to unlock their full potential. For instance, the manufacturing sector—which accounts for roughly 15 percent of GDP—has low levels of digitalization.

Accelerated digitalization could be a key new driver of growth. Croatia's digital economy, encompassing all digital activities in all sectors of the economy, currently accounts for roughly 5 percent of GDP, equivalent to €2.4 billion. By 2025, Croatia's digital economy could contribute up to €8.3 billion in GDP—accounting for roughly 11 percent of GDP and realizing an additional €2,000 GDP per capita.[7]

Croatia is well placed to build on its existing strengths to drive digitalization. For instance, young Croatians have good digital skills; in fact, Eurostat has rated Croatians between the ages of 16 and 24 as having better digital skills than their peers in any other European nation.[8] The country also has competitive labour costs and a thriving and innovative tech sector.

For Croatia to realize this potential, the following three dimensions—key to understanding the future of work—will need to be considered in policy making. First, all stakeholders will need to gain an understanding of how technology, automation, industry-specific trends and macro-economic trends will transform the nature of work and work activities in the future. Second, policy makers will need to understand evolving labour demand and identify the mix of talent, education, and skills needed to support future reskilling needs—with an increased emphasis on human-capital development. Third, businesses may need to adopt new working models to optimize both work and the workforce—taking cognizance of structural shifts because of virtual work and the likely impact on real estate footprint.

In fact, a recent initiative illustrates that Croatian stakeholders are already taking steps to understand and plan for the mix of skills and occupations that are likely to be needed in the future. A1, a leading telecommunications company, collaborated with a team of 27 scientists, academics, and industry experts—as well as the founders of top technology companies—to produce a map of jobs and skills of the future. The map details the most important skills for 100 future occupations across 10 industries in Croatia and was inspired by the World Economic Forum's Future of Jobs report, Gartner surveys, and MGI's research on the future of work.[9]

7 According to Statista, Croatia's projected GDP is €73 billion by 2025; "Croatia – Emerging digital challenger," 2018.
8 Eurostat, Share of young people with basic or above digital skills, 2019
9 A1, The first Croatian map of jobs and skills of the future, a1.hr

2 The impact of automation, AI and digital technologies on occupations, sectors, and regions

This section assesses Croatia's potential for automation in the coming decade, across sectors and occupations. Our key finding is that repetitive activities that are highly susceptible to automation currently account for approximately 54 percent of work time. One scenario indicates that approximately 22 percent of work hours in Croatia could be automated by 2030. This section also presents a detailed analysis of how this scenario will affect four archetypal Croatian counties.

22%

of work hours in Croatia could be automated by 2030

2.1.Croatia's automation potential

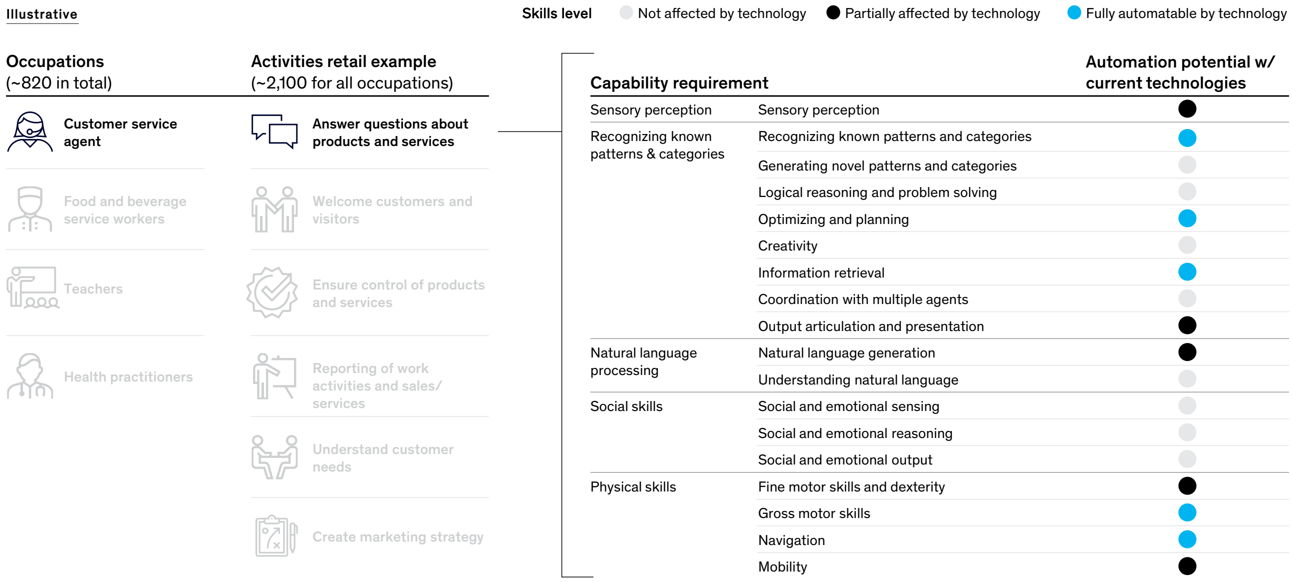
This report applied MGI's automation-adoption framework that assesses the automation development and adoption timeline for 820 occupations and 2,100 activities across 17 sectors (Exhibit 2). The technical potential for automation of the global economy and projected adoption rates are determined by an analysis of the underlying work activities for each occupation, covering more than 60 countries. This analysis uses databases published by institutions which include the US Bureau of Labor Statistics 2018 O*Net database to break down around 800 occupations into more than 2,000 activities, and it determines the performance capabilities needed for each activity based on the way humans currently perform it. The report further breaks down activity into 18 capabilities and assesses their technical automation potential. This framework is informed by academic research, internal expertise, and industry experts. Our report takes the automation adoption percentage through to 2030.

We use these findings to size the number of jobs that could be automated by 2030. We assume that each hour of work that could be automated will result in proportional job loss. For example, if 10 percent of current work-activity hours in an occupation will be automated, then 10 percent of jobs in that occupation will be displaced. It is unclear if this assumption is conservative or aggressive. Based on what we have seen historically, we expect in many cases that the result of activity automation will be a redistribution of efforts to other existing or new activities. However, it is also possible that with automation, existing work processes could be radically overhauled and reduced in complexity, reducing labour demand even further beyond the automation potential of current activities. We have not modeled these countervailing effects.

Exhibit 2

We identified automation potential for each occupation by detailed activities (~2,100 distinct activities analyzed)

McKinsey Global Institute workforce skills model



Source: Croatian Bureau of Statistics, O*NET, BLS, MGI Automation Model July 2021, MGI FoW post-COVID model, July 2021; McKinsey Global Institute analysis

Jobs lost = (Weighted automation adoption) × 2030 labour force.

To calculate the work hours automated in 2030, we multiply the automation-adoption percentage by the size of the labour force in 2030. In doing this, we assume that the occupation mix of the economy and the underlying work activities in each occupation in 2030 are the same as today. This is a conservative assumption, because in reality we would expect that jobs will not be added back with the same occupation mix, and that new jobs will be added in less automatable sectors.

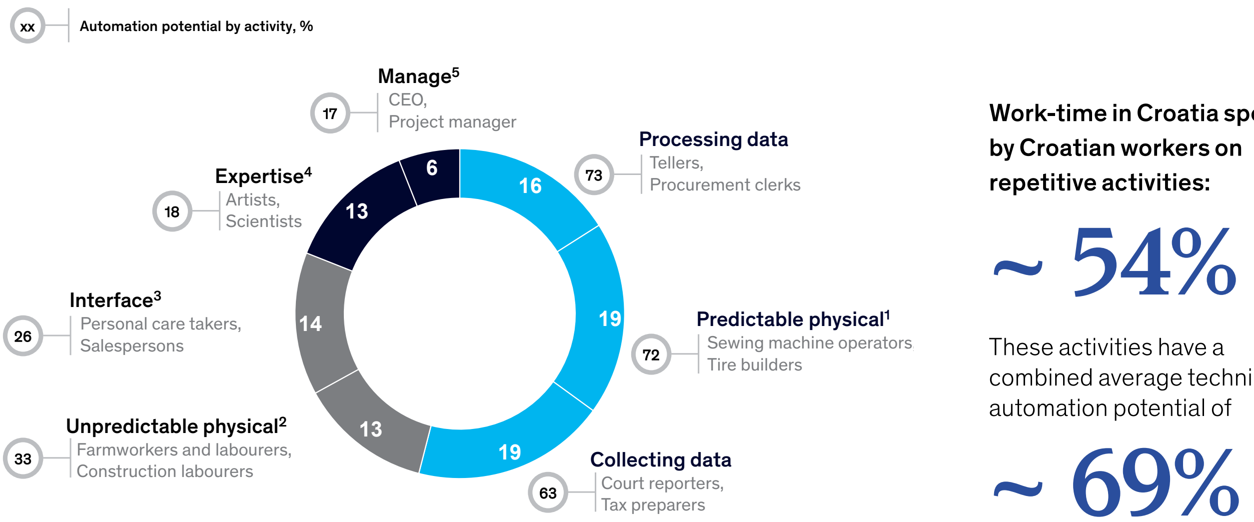
To estimate the size of the 2030 labour force, we use population projections from the United Nations, labour-force participation projections from the International Labour Organization and the natural unemployment rate for OECD countries.

Our findings indicate that more than half of working hours in Croatia are spent on activities that are highly susceptible to automation. We analyzed 2,100 activities grouped in seven types of activity categories: processing data; predictable physical activities and operating machinery in predictable environments; collecting data; unpredictable physical activities and operating machinery in unpredictable environments; interfacing with stakeholders; applying expertise to decision making, planning and creative tasks; and managing and developing people. Of these, collecting and processing data and performing predictable physical activities are the most susceptible to automation. These repetitive activities currently account for approximately 54 percent of work time and have a combined average technical-automation potential of roughly 69 percent. Occupations that exhibit high levels of these activities include tellers, sewing-machine operators and court reporters. Activities that are less susceptible to automation are those that require expertise or depend on performing unpredictable physical tasks or interacting with others (Exhibit 3).

Exhibit 3

Time spent across all occupations in Croatia 2019

Percentage of 2019 work-hours base



1. Performing physical activities and operating machinery in predictable environments.
2. Performing physical activities and operating machinery in unpredictable environments.
3. Interfacing with stakeholders.
4. Applying expertise to decision making, planning, and creative tasks.
5. Managing and developing people.

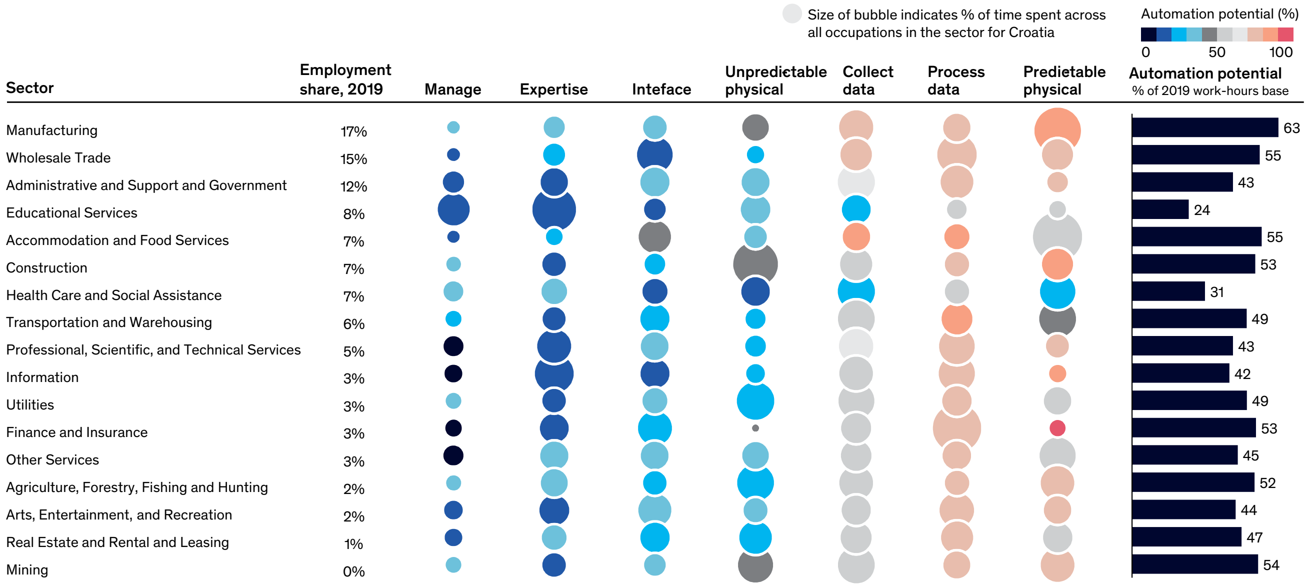
NOTE: Numbers may not sum to 100 due to rounding.

Source: Croatian Bureau of Statistics, O*NET, BLS, MGI Automation Model July 2021, MGI FoW post-COVID model, July 2021; McKinsey Global Institute analysis

Taking a sectoral view, we see that Croatia's manufacturing sector exhibits the highest automation potential, at 63 percent. This is due to the sector's high share of repetitive and predictable physical work. Automation in manufacturing may have a profound impact on the future of work, as the sector has the highest share of employment, at 17 percent of Croatia's total employment in 2019. Of the 17 sectors analyzed, wholesale trade and accommodation and food services also show high automation potential, both at 55 percent. This is possibly due to their reliance on collecting and processing data and performing predictable physical activities. The financial services sector shows a high percentage of time spent on data processing, also leading to high automation potential. Conversely, the education sector, which relies far more on expertise, has the lowest automation potential, at 24 percent (Exhibit 4).

Exhibit 4

Croatia's manufacturing sector has the highest automation potential owning to its high share of repetitive physical work



NOTE: Numbers may not sum to 100 due to rounding.
Source: Croatian Bureau of Statistics, O*NET, BLS, MGI Automation Model July 2021, MGI FoW post-COVID model, July 2021; McKinsey Global Institute analysis

However, even if certain skills or occupations have high automation potential, this does not mean that organizations will adopt the technology necessary to implement it. Five factors affect the pace and extent of automation: technical feasibility, cost of developing and deploying technological solutions, labour-market dynamics, economic benefits, and regulatory, organizational, and social acceptance (Exhibit 5). Organizations may move through stages of assessing their automation potential, developing a solution, and assessing its economic feasibility before adopting automation. Moreover, automation is not necessarily implemented in one step. Our model assumes that adoption will begin once automation costs are at least on par with labour costs for a particular activity.

We compared detailed data on Croatian salaries and wage evolution to the costs associated with automation technologies, such as solution-specific costs and how these evolve over time, and took broader local trends into account to assess automation adoption rates.

Using this approach, we determined three scenarios for automation adoption in Croatia: early, late, and midpoint—the average of the early and late scenarios.

Exhibit 5

Five factors affect the pace and extent of automation adoption in our model

Key factor	Technical feasibility		Cost of developing and deploying	Labour market dynamics	Economic benefits	Regulatory and social acceptance
Impact on pace and extent of automation	For an activity to be automated, every capability utilized for that activity must reach the required level of performance	Capabilities need to be integrated to form solutions	Costs associated with developing as well as deploying different solutions determine the pace of reaching economic feasibility	Economic feasibility of automation will depend on comparison with cost of human labour, affected by supply and demand dynamics	In addition to labour cost savings, automation could bring more benefits to employers, including increased quality and efficiency and decreased error rate	Adoption of automation shaped by pace of organizational change, policy choices, and acceptance to stakeholders

Stage	Technical automation potential	Solution development	Economic feasibility	Adoption
How we model it	Estimated technology progression timeline for each capability through interviews and surveys with industry and academic experts	Estimated solution development times for activities based on required capabilities and historical development timelines	Assume adoption begins when automation cost for an activity is at parity with labour cost Compare labour wage and solution cost • Occupation-specific wages and their evolution • Solution-specific costs and their reduction	Model includes S-shaped adoption curve based on historical technology adoption rates

1. We define automation potential by the work activities that can be automated by adapting currently demonstrated technology

Source: Croatian Bureau of Statistics, O*NET, BLS, MGI Automation Model July 2021, MGI FoW post-COVID model, July 2021; McKinsey Global Institute analysis

The early scenario, corresponding to rapid adoption of digital technologies, indicates that 49 percent of working hours in Croatia could be automated or displaced by 2030. Croatia's current automation potential is one of the highest in Europe, at 49 percent, corresponding to the high level of repetitive, predictable tasks performed by the Croatian workforce. But this scenario where automation is implemented to this extent is extreme and highly unlikely. Automation technologies and solutions would need to be developed rapidly to enable such wide-scale adoption. This would require both the public and private sectors to invest significantly in research and development, and organizations to invest in the digitally enabled infrastructure needed to support automation. Educational institutions would also have to play a role in developing a skilled labour pool in such a scenario. Furthermore, there would likely be social, political, and organizational resistance to rapid automation, which would need to be overcome through a change in mindset and involve government and public consultation, consensus and support. This scenario could dramatically increase productivity, but would have significant societal implications for jobs, employment conditions, and the education required for future skills needs.

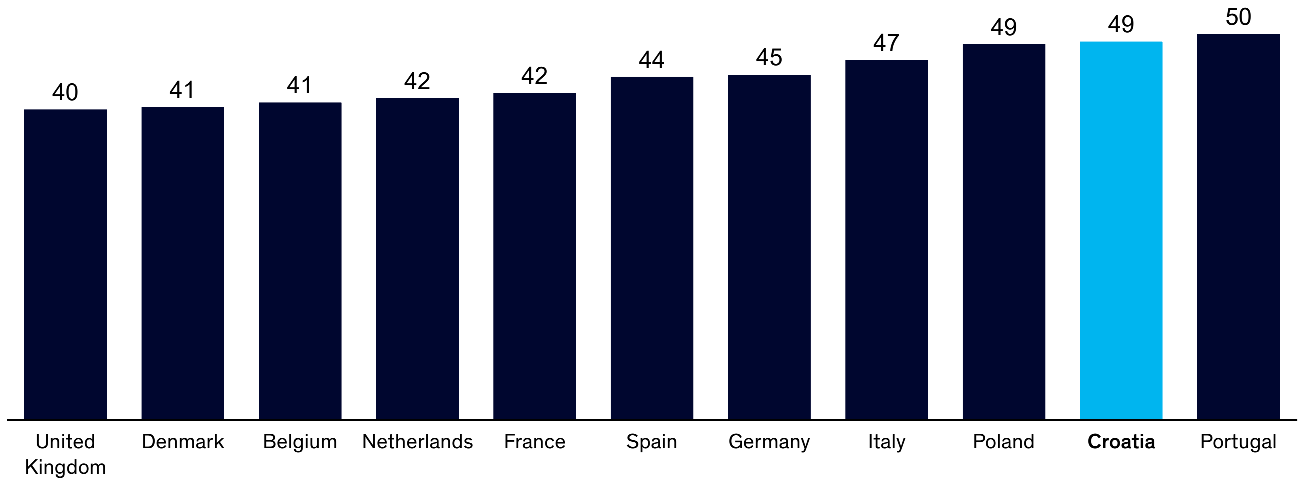
The late-adoption scenario, corresponding to a much slower uptake of digital technologies, shows significantly less automation and less potential for job displacement. There would also be less improvement in productivity levels and slow economic growth. Such a scenario could lead to Croatian companies becoming less competitive globally.

The midpoint scenario is the one considered in this report, given its highest probability. In this scenario, approximately 22 percent of work hours in Croatia could be automated by 2030. Although COVID-19 is a recent phenomenon, and its effects may fade over the coming decade, it has accelerated certain trends which have an impact on the long-term view. This scenario takes into account the recent acceleration of automation owing to COVID-19 and includes the effect of post-COVID-19 trends. This level of automation could have an effect on job displacement. However, jobs displaced by automation are expected to be offset by the creation of additional jobs and occupations. An estimated over 280,000 jobs could be lost to automation in this scenario; an additionaly over 50,000 jobs could be lost owing to post-COVID-19 trends. These could, however, be offset by the creation of 240,000 jobs owing to macro-economic trends and necessary policy and ecosystem measures. As new occupations are created every year, the scenario includes 97,000 jobs in new occupations that will likely appear by 2030, which will also offset jobs displaced by automation. However, in this scenario up to 140,000 workers may be displaced by 2030.

Exhibit 6

Croatia's automation potential is one of the highest in Europe

Automation potential, percentage of 2019 work-hours base

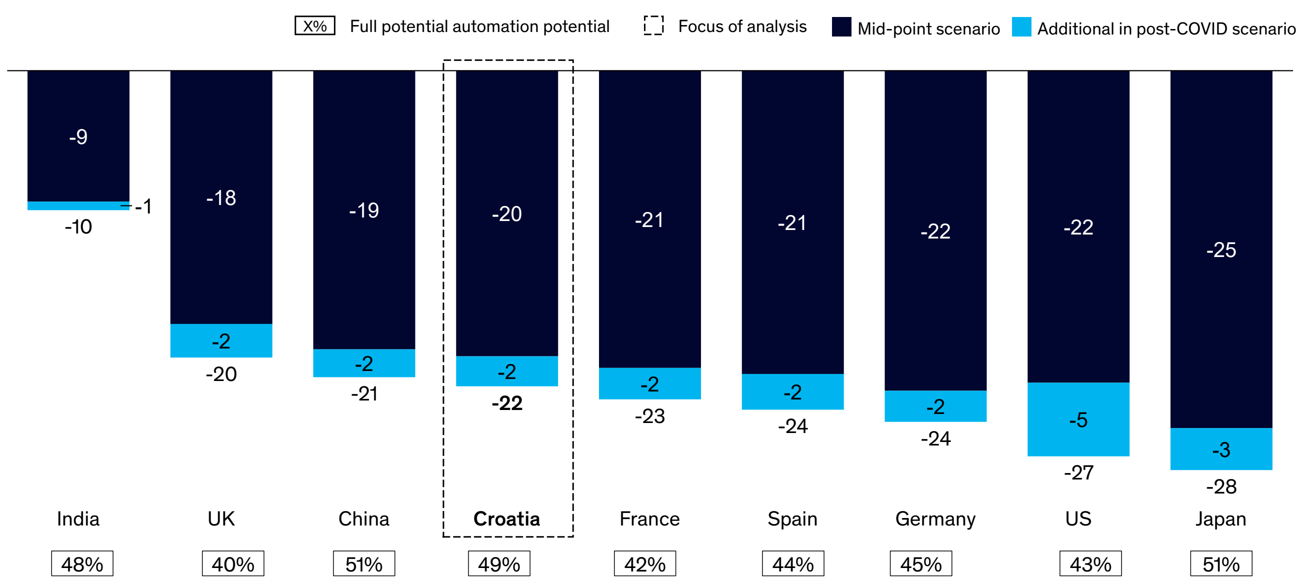


Source: Croatian Bureau of Statistics, O*NET, BLS, MGI Automation Model July 2021, MGI FoW post-COVID model, July 2021; McKinsey Global Institute analysis

Exhibit 7

However, Croatia is expected to automate ~22% of 2019 total work-hours by 2030, with COVID-19 providing boost in adoption

Automation adoption, percentage of 2019 work-hours expected to be automated, 2030



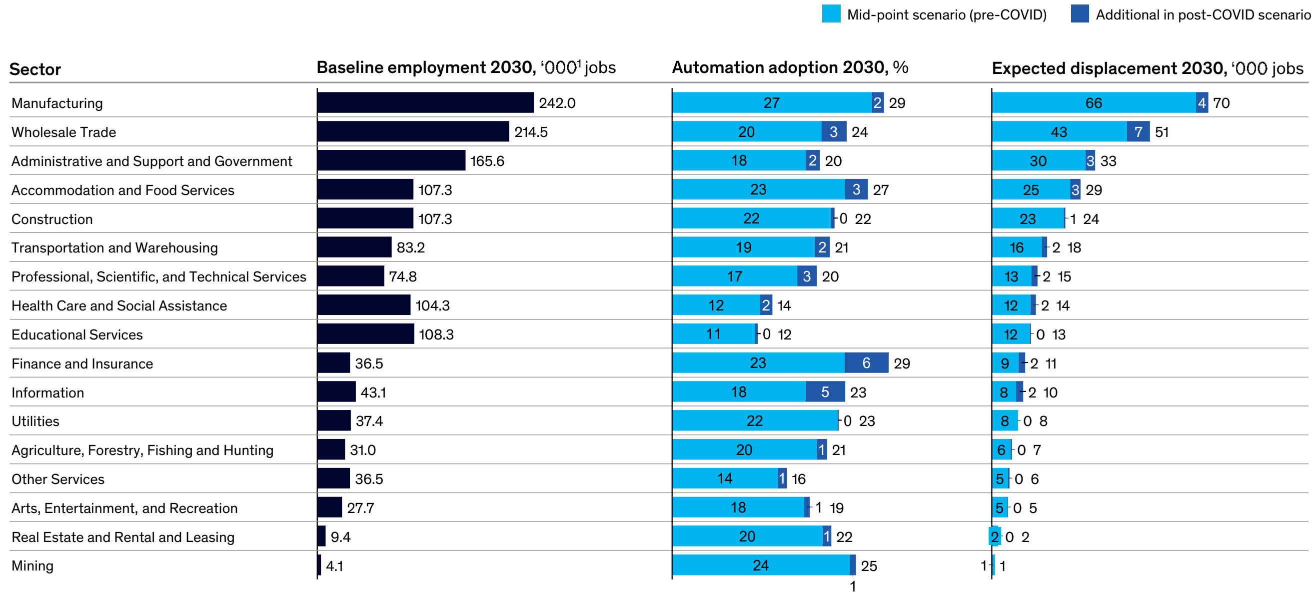
NOTE: Numbers may not sum to 100 due to rounding.

Source: Croatian Bureau of Statistics, O*NET, BLS, MGI Automation Model July 2021, MGI FoW post-COVID model, July 2021; McKinsey Global Institute analysis

Exhibit 8

Manufacturing, wholesale trade and administrative and support and government sectors are expected to have the highest workforce displacement

Automation adoption & jobs displacement, 2030



1. Before any impact of automation

NOTE: Numbers may not sum to 100 due to rounding.

Source: Croatian Bureau of Statistics, O*NET, BLS, MGI Automation Model July 2021, MGI FoW post-COVID model, July 2021; McKinsey Global Institute analysis

Croatia’s maximum automation potential by 2030

49%

Overall, our findings indicate that Croatia’s automation potential is one of the highest in Europe, at 49 percent. By comparison, Portugal has an automation potential of 50 percent, and the United Kingdom’s automation potential is estimated at 40 percent (Exhibit 6). These findings correspond to the high level of repetitive, predictable tasks performed by the Croatian workforce. In general, economies that rely on occupations and activities involving high levels of expertise have a lower automation potential.

Even though Croatia’s potential for automation sits at 49 percent, in reality it may not be possible, or feasible, to implement automation across all sectors. Particularly when wages are lower than the costs associated with automation, there is little incentive to invest in new technology. There are also regulatory and social factors which will limit the uptake of digitalization and automation.

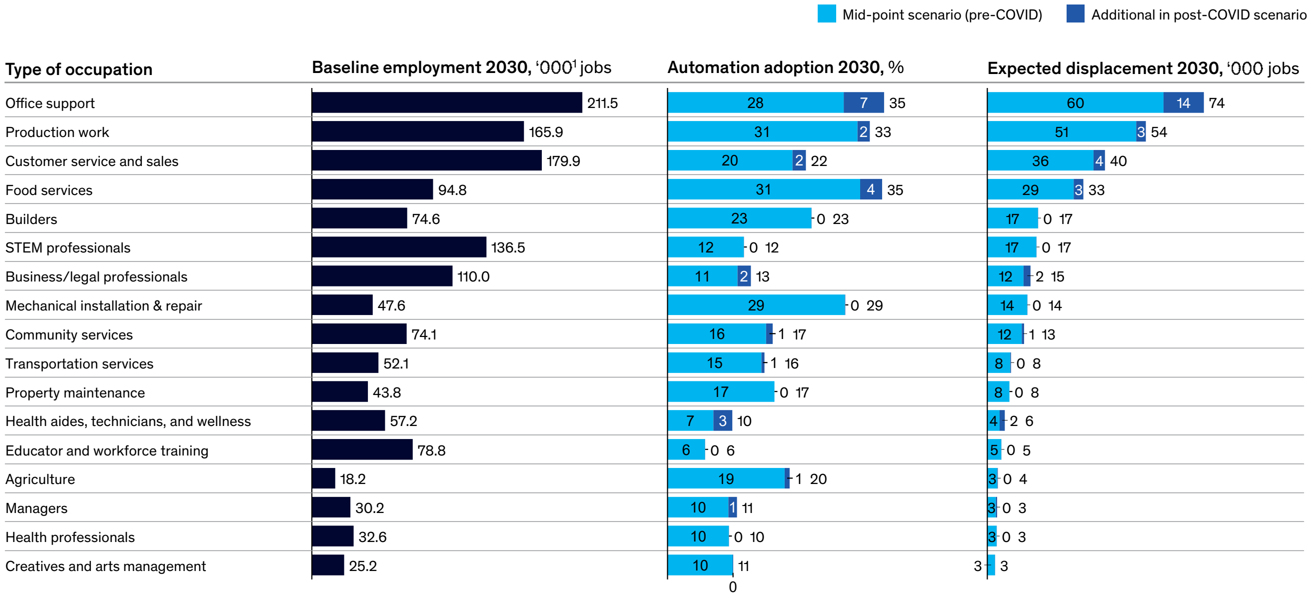
Even factoring in additional automation resulting from post-COVID-19 trends, automation in Croatia is still expected to take place at a moderate rate of 22 percent (Exhibit 7). While COVID-19 has had a dramatic impact on lives and livelihoods in recent months, this report takes a ten year view. Trends accelerated by COVID-19 have had an impact on automation adoption, and will continue to do so, but this will likely only account for roughly 2 percent of the anticipated rate of adoption over the next ten years.

Automation adoption rates are likely to vary across sectors, with different implications for job displacement. Of the 17 sectors analyzed, the manufacturing sector is expected to have the highest workforce displacement, equating to roughly 70,000 jobs lost to automation by 2030. This is in keeping with the sector’s high potential for automation, and relatively high automation-adoption rate of 29 percent. Jobs in wholesale trade, and in the administrative support and government sectors, are also expected to have high workforce displacement, corresponding to 51,000 and 33,000 jobs displaced respectively. Conversely, the mining sector, while expected to have a high automation-adoption rate of 25 percent, is expected to have very low workforce displacement in line with the sector’s relatively low contribution to employment (Exhibit 8).

Exhibit 9

Jobs in office support, production work, and customer service and sales occupations are expected to be most vulnerable to automation

Automation adoption & jobs displacement, 2030



1. Before any impact of automation

NOTE: Numbers may not sum to 100 due to rounding.

Source: Croatian Bureau of Statistics, O*NET, BLS, MGI Automation Model July 2021, MGI FoW post-COVID model, July 2021; McKinsey Global Institute analysis

Looking at types of occupations, jobs in office support, production, and customer service and sales are expected to be most vulnerable to displacement via automation. Office support roles, in particular, could likely see high rates of automation, at approximately 35 percent, which could correspond to 74,000 jobs being displaced by 2030. On the other end of the scale, occupations which rely less on repetitive tasks and require specific expertise—such as health professions or jobs involving creative roles—are expected to see low automation-adoption rates with low job displacement (Exhibit 9).

2.2. A regional perspective

Within this country-wide view, automation adoption, and its effect on jobs, is expected to vary across counties. As noted in an MGI report on the future of work in Europe, megatrends affect different regions in different ways depending on the current skills mix in the local labour force, the spread of industries, and the education levels in each region.[10] Policy makers and decision makers in business and government need to take regional variations into account to make sure opportunities and actions are appropriate in different regions.

We selected four Croatian counties—the City of Zagreb, Istria, Osijek-Baranja, and Split-Dalmatia—for a deep-dive analysis into specific future-of-work trends. These counties were chosen as together they provide insight into a variety of local economies where certain industries are dominant. Istria and Split-Dalmatia are coastal counties, and more orientated towards tourism, while the inland county of Osijek-Baranja relies more heavily on agriculture and other non-tourism-related services. Zagreb, Croatia's capital and business hub, is home to many of the country's STEM, business and legal professionals. The city also has a thriving tech sector, and roughly 70 percent of Croatian start-ups are located here. Additionally, two of the five clinical hospital centers in the country are in Zagreb.[11]

The counties also cover all geographic regions—coastal, inland and central. And the mix of counties provides a spread of different levels of GDP per capita: compared to Croatia as a whole, Zagreb and Istria have relatively high GDP per capita, Split-Dalmatia is average, and Osijek-Baranja shows lower GDP per capita.

There are similarities across counties when it comes to expected job displacement owing to automation. Most notably, jobs in office support, production, and customer service and sales are expected to be most vulnerable to automation in all four selected counties. As the mix of industries and current workforce skills differs across counties, automation will have different effects on job displacement.

For instance, as Zagreb currently has a higher number of office support workers than the other three counties, increased automation is likely to have the most significant impact on job displacement in these roles in the city. Office support roles are expected to see automation adoption rates of 39 percent, corresponding to 28,000 jobs likely to be displaced in Zagreb by 2030 (Exhibit 10). In Istria the effects of automation will likely be most noticeable in the displacement of jobs across three occupations: office support, food services and production work (Exhibit 11). Similarly, in Osijek-Baranja jobs in office support, production, and customer services and sales are expected to see high levels of displacement (Exhibit 12). As Split-Dalmatia relies heavily on tourism, the county employs large number of workers in customer services. Automation adoption is unlikely to lead to large numbers of these jobs being displaced. In this county, the highest displacement is expected to be in office support jobs, at approximately 5,500 jobs by 2030 (Exhibit 13).

---

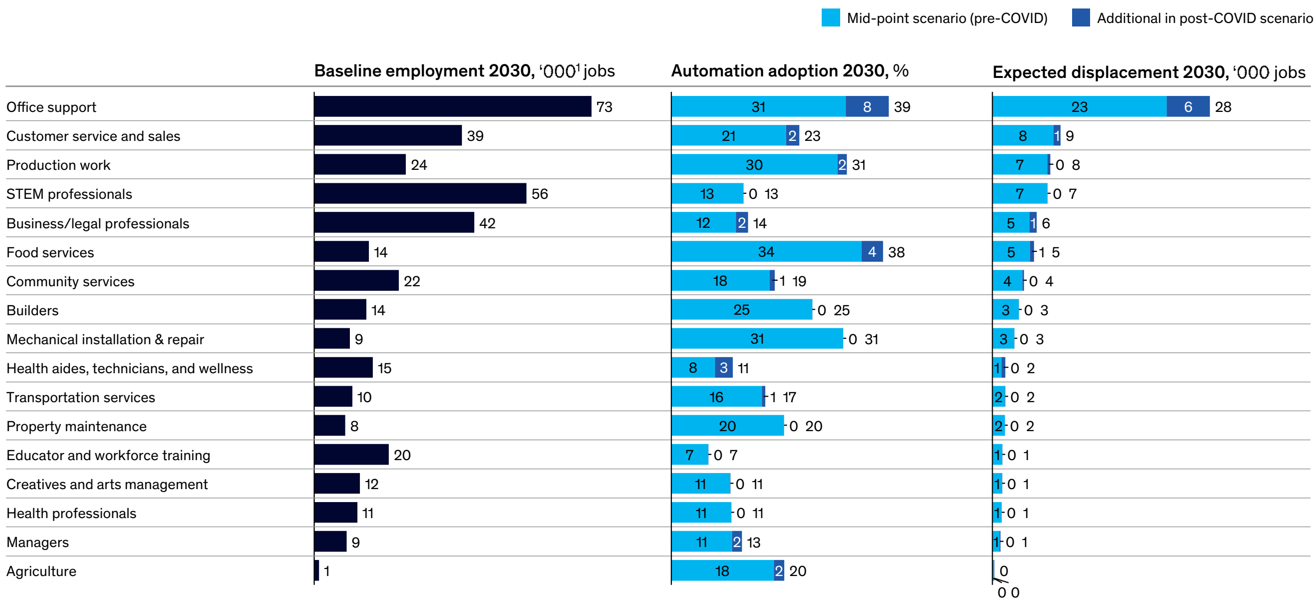
10 "The future of work in Europe," McKinsey Global Institute, June 2020.
11 Ministry of Health, Republic of Croatia, zdravlje.gov.hr.

City of Zagreb

Exhibit 10

Office support, customer service and sales, and production occupations are expected to be most vulnerable to automation

Automation adoption & jobs displacement, 2030



1. Before any impact of automation

NOTE: Numbers may not sum to 100 due to rounding.

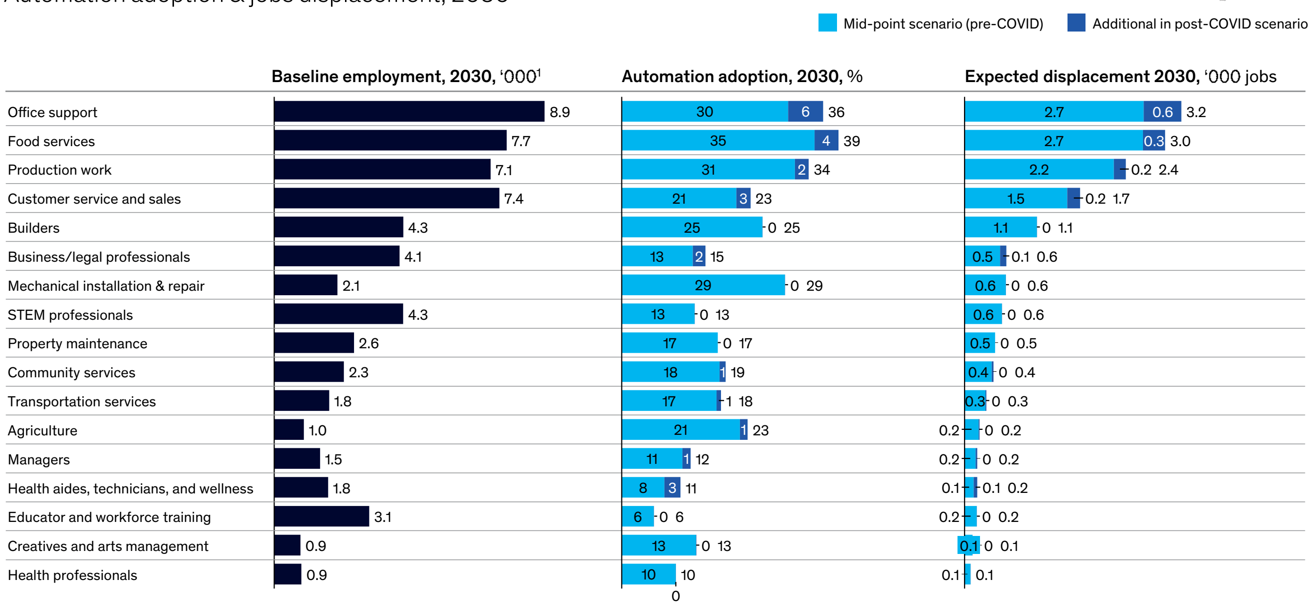
Source: Croatian Bureau of Statistics, O*NET, BLS, MGI Automation Model July 2021, MGI FoW post-COVID model, July 2021; McKinsey Global Institute analysis

Istria

Exhibit 11

Office support, food services, and production occupations are expected to be most vulnerable to automation

Automation adoption & jobs displacement, 2030



1. Before any impact of automation

NOTE: Numbers may not sum to 100 due to rounding.

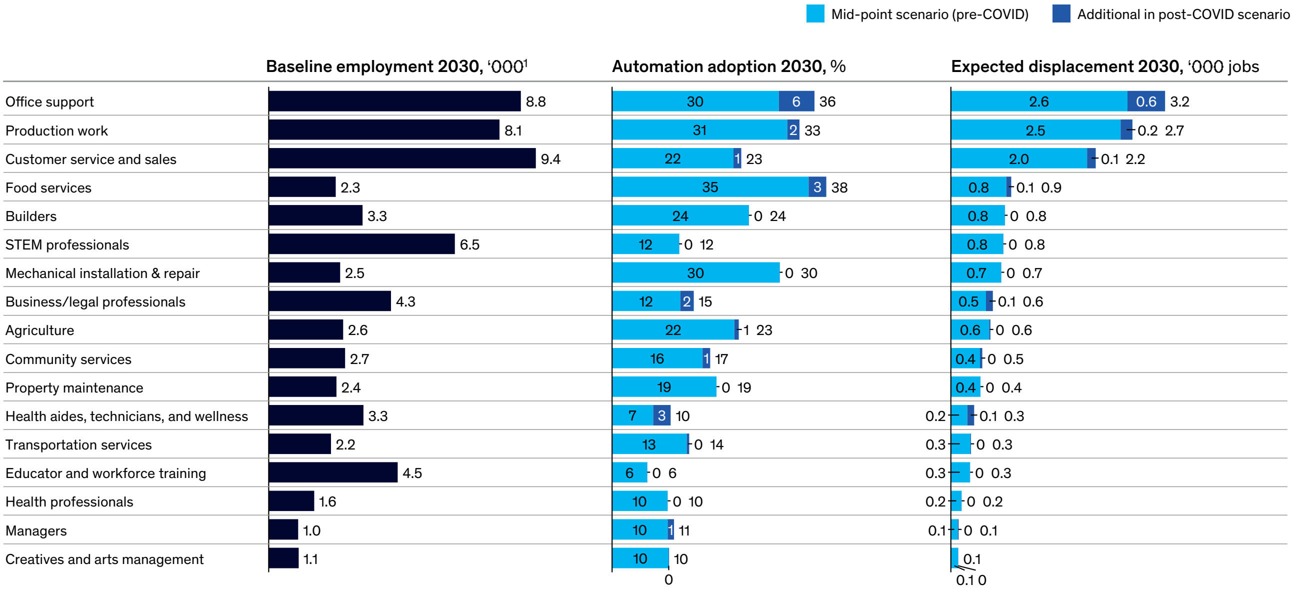
Source: Croatian Bureau of Statistics, O*NET, BLS, MGI Automation Model July 2021, MGI FoW post-COVID model, July 2021; McKinsey Global Institute analysis

Osijek-Baranja

Exhibit 12

Office support, production, customer service and sales, and food services occupations are expected to see largest displacement

Automation adoption & jobs displacement, 2030



1. Before any impact of automation

NOTE: Numbers may not sum to 100 due to rounding.

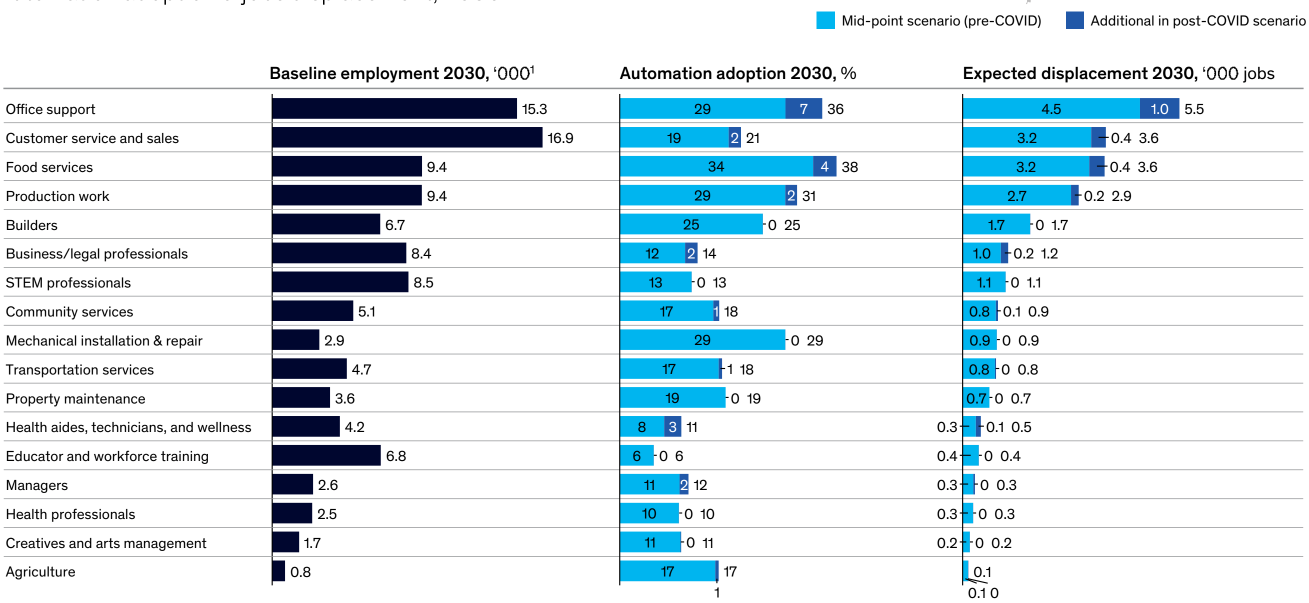
Source: Croatian Bureau of Statistics, O*NET, BLS, MGI Automation Model July 2021, MGI FoW post-COVID model, July 2021; McKinsey Global Institute analysis

Split-Dalmatia

Exhibit 13

Office support, customer service and sales, and food services occupations are expected to see highest workforce displacement

Automation adoption & jobs displacement, 2030



1. Before any impact of automation

NOTE: Numbers may not sum to 100 due to rounding.

Source: Croatian Bureau of Statistics, O*NET, BLS, MGI Automation Model July 2021, MGI FoW post-COVID model, July 2021; McKinsey Global Institute analysis

Methodology

In preparing this report, we drew on a rich data set, including detailed country-wide occupation and wage data for each sector and Croatia-specific indicators related to education, energy, infrastructure, technology, and macroeconomics.

We employed a threefold methodology to project jobs lost, jobs gained through automation, and impact on skill requirements.

For jobs lost, we examined 820 occupations and 2,100 work activities for 18 skills across 17 sectors, and identified each activity's time susceptible to automation as lost work time.

In addition, we modeled the impact of the ten largest trends on labour demand to calculate the impact on workforce growth. In particular, we modeled the effect of seven long-term macro trends—rising incomes, ageing populations, technology investment, infrastructure investment, rising education levels, energy transitions, and marketization of unpaid work—on labour-force growth by 2030. We also took into account three trends that have been accelerated by COVID-19: changes in consumer and business preferences, such as the expansion of e-commerce and reduced business travel; shifts in business models, including accelerated use of automation and AI, increased remote work, and an increase in the use of contract and freelance workers; and changes in industry structure, for instance greater market consolidation and a decline in small business, and shifts in global value chains.

For the implications of skill changes, we defined current and required skills for the changing nature of jobs by mapping each of the 2,100 activities to 25 skills in five categories to understand the skills gap to be closed through talent transformation. We studied in detail how this change will affect 17 different sectors.

We held discussions with representatives of business, academia, media, the social sector, and government to interpret the results, fine-tune implication estimations, and exchange ideas on potential actions that stakeholders could take to help us develop an assessment of Croatia's talent transformation in the digital era .

3 Opportunities for workforce growth and new jobs

Although automation and digitalization could lead to job losses, various factors could contribute to new jobs being created by 2030. We examined long-term macro trends, as well as trends accelerated by COVID-19, to assess the impact on the mix of jobs in the Croatian economy and identify sources of potential labour demand. It is worth noting that this model estimates potential labour demand—whether this potential is captured will depend on the choices and investments made by businesses, policy makers, and workers.

The seven long-term macro trends we examined are expected to contribute to an increase in jobs in the coming decade: rising incomes, ageing populations, technology investment, infrastructure investment, rising education levels, energy efficiency and transitions, and marketization of unpaid work. However, COVID-19 has accelerated remote work and led to faster adoption of automation and AI—factors which contribute to job losses. The rise in e-commerce, and increased use of digital channels, have the potential to both create and reduce jobs.

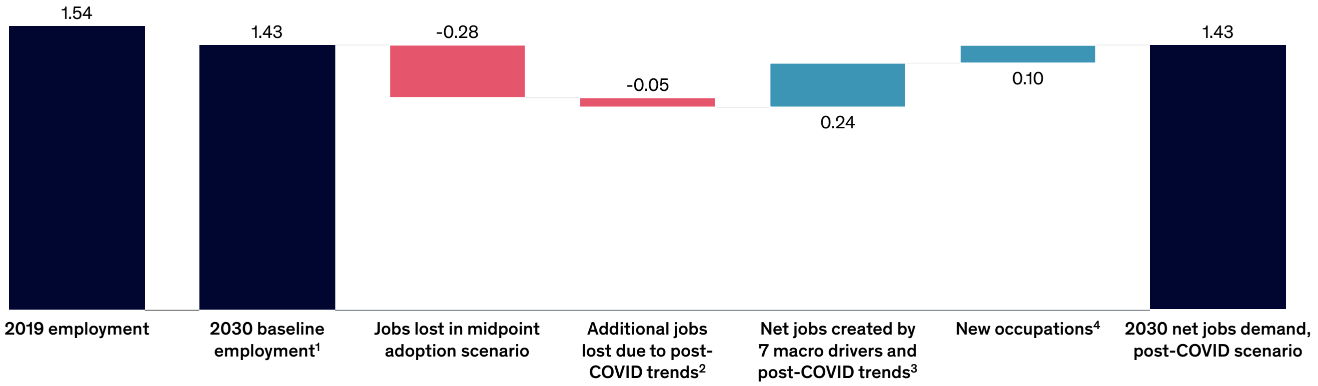
At a country level, jobs displaced by automation and COVID-19 trends are expected to be offset by the creation of new jobs. An estimated over 280,000 jobs may be lost to automation, and over 50,000 jobs may be lost due to post-COVID-19 trends. However these are likely to be offset by the creation of 240,000 jobs and almost 97,000 new occupations by 2030 (Exhibit 14). This model rests on two assumptions. First, new occupations will be created every year at a rate of 0.56 percent of total employment.[12] This will account for 97,000 jobs in new occupations by 2030. Second, the economy will eventually return to long-term employment levels—as the Croatian population is decreasing, the same level of employment will result in a decrease in overall numbers of jobs, but by 2030 net labour demand will equal employment.

[12] Jeffrey Lin, "Technological adaptation, cities, and new work," Review of Economics and Statistics, volume 93, number 2, May 2011.

Exhibit 14

Jobs displaced by automation and COVID trends are expected to be offset by the creation of new jobs in Croatia

Net change in labour demand, million



NOTE: Net sum might differ slightly due to rounding.

1. Based on Croatia's declining population trend which will lead to lower labour force and lower overall active workforce and employment

2. The post-COVID-19 scenario includes all pre-COVID-19 trends as well as accelerated automation, accelerated e-commerce, increased remote work, and reduced business travel

3. The 7 macro drivers include: rising incomes, aging populations, increased technology use, energy efficiency and transitions, infrastructure investment, rising education levels. and marketization of unpaid work.

4. We assume new occupations are created every year at a rate of 0.56% of total employment (Jeffrey Lin, "Technological adaptation, cities, and new work," Review of Economics and Statistics, volume 93, number 2, May 2011)

Source: Croatian Bureau of Statistics, O*NET, BLS, MGI Automation Model July 2021, MGI FoW post-COVID model, July 2021; McKinsey Global Institute analysis

On a sectoral level, healthcare, the arts, and the financial sectors are expected to see the highest increases in labour demand (Exhibit 15). This is due to a combination of an increase in projected demand and the low impact of automation on these sectors. Croatia's ageing population will likely increase demand for healthcare and social assistance in the coming decade. And as jobs in this sector generally require expertise, human interaction, and a high level of socio-emotional skills, they are likely to be less automated. Rising incomes may contribute to an increased demand for arts, entertainment, recreation, and financial services. McKinsey's report on workforce transitions points out that, as incomes rise, consumers spend more on all categories. But their spending patterns also shift, creating more jobs in areas such as consumer durables, leisure activities, financial and telecommunication services, housing, healthcare, and education.[13] Furthermore, the art and entertainment sectors require skills such as creativity which have a low potential for automation or job displacement resulting from technology. In fact, advances in technology in these areas may create new occupations.

Conversely, sectors that have high automation potential, such as manufacturing, wholesale trade, and administrative, support and government, are likely to see the largest net decline in labour demand.

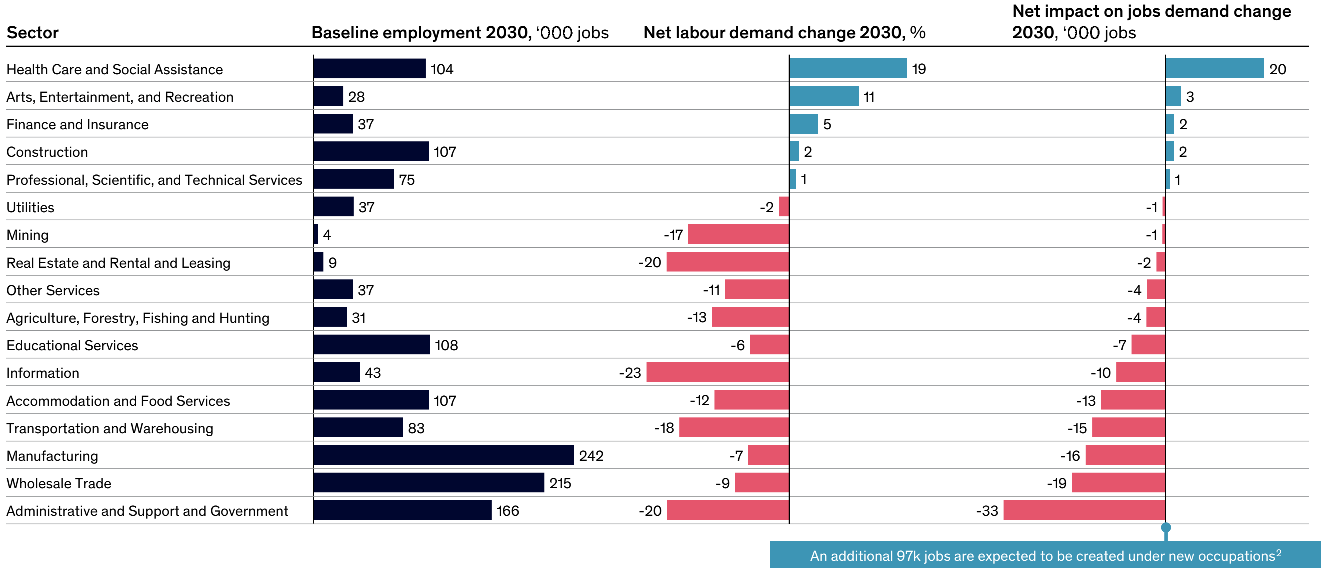
Given the expected increase in demand for healthcare, it follows that occupations in this sector is likely to see the highest growth in demand, including health professionals such as doctors and nurses, as well as health technicians, home health aides, and personal-care aides. And as the arts and entertainment sectors grow,so too should the demand for creative occupations, and roles in arts management. Overall, demand for managers is likely to see increase. There shall also be an increase in demand for highly skilled occupations such as STEM professionals and business or legal professionals. Conversely, occupations that rely mainly on physical activities, or consist of repetitive tasks that have high automation potential, will likely see a decline in demand—such as production or office support roles (Exhibit 16). McKinsey's analysis of the future of work in the United Kingdom sheds light on these trends. Most notably, technology affects higher- and lower-skilled workers very differently. It tends to augment the number of highly skilled workers, for example by making doctors more

[13] "Jobs lost, jobs gained: Workforce transitions in a time of automation," McKinsey Global Institute, December 2017.

Exhibit 15

Healthcare, arts, entertainment and recreation, and financial sectors are expected to see the highest net increases in labour demand

Net change in labour demand[1], post-COVID scenario



1. Based on Croatia's declining population trend which will lead to lower labour force and lower overall active workforce and employment

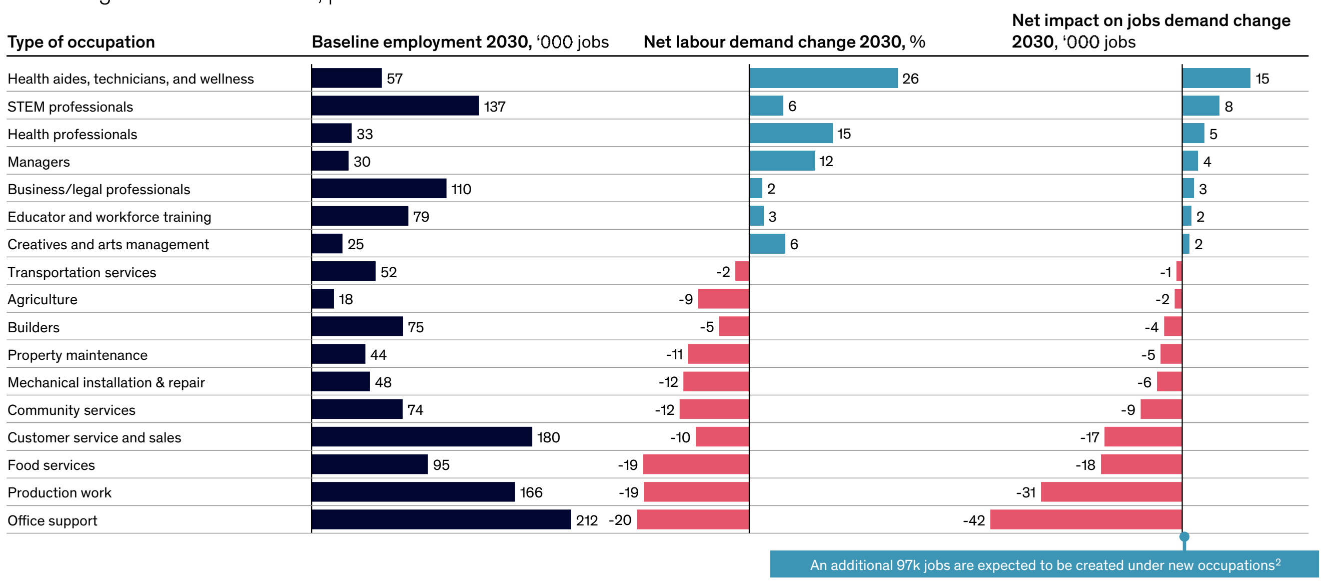
2. We assume new occupations are created every year at a rate of 0.56% of total employment (Jeffrey Lin, "Technological adaptation, cities, and new work," Review of Economics and Statistics, volume 93, number 2, May 2011);

Source: Croatian Bureau of Statistics, O*NET, BLS, MGI Automation Model July 2021, MGI FoW post-COVID model, July 2021; McKinsey Global Institute analysis

Exhibit 16

Healthcare and STEM occupations are expected to see highest net demand growth, while office support and production work could shrink the most

Net change in labour demand[1], post-COVID scenario



1. Based on Croatia's declining population trend which will lead to lower labour force and lower overall active workforce and employment

2. We assume new occupations are created every year at a rate of 0.56% of total employment (Jeffrey Lin, "Technological adaptation, cities, and new work," Review of Economics and Statistics, volume 93, number 2, May 2011);

Source: Croatian Bureau of Statistics, O*NET, BLS, MGI Automation Model July 2021, MGI FoW post-COVID model, July 2021; McKinsey Global Institute analysis

efficient and effective at treating patients. This tends to increase demand for the services that such professionals provide, which in turn increases their employment. In contrast, when the tasks performed by workers require lower skills, those workers can be replaced by machines more easily. In the short term, this tends to lead to talent shortages among high-skilled occupations, along with a narrowing of job opportunities for lower-skilled workers.[14] These country-wide trends may differ regionally. In Zagreb, demand for office support roles could decrease by 25 percent. However, demand for STEM professionals and managers is likely to increase. Additionally, the city could see a marked increase in demand for all types of healthcare occupations—demand for healthcare workers is expected to increase by 24 percent, and demand for health professionals by 14 percent, resulting in a net impact of around an additional 6,000 jobs in healthcare in the city by 2030. These jobs include 4,000 jobs for healthcare workers, and 2,000 jobs for health professionals (Exhibit 17).

Similarly, in Istria, office support, food services, and production occupations could see up to a 25 percent decline in demand. But demand for healthcare workers and health professionals will also see a marked increase, of around 26 percent and 13 percent respectively. There would also be greater demand for managers, at around 10 percent—this figure is slightly higher than the anticipated demand for managers in Zagreb, at 9 percent.

In Osijek-Baranja, the three occupations that currently have the highest share of employment—customer service and sales, production, and office support—could see the highest decline in absolute demand (Exhibit 19). This could exacerbate the region's already high unemployment rate, currently the third highest in the country, and contribute to many job seekers leaving area for other cities, or moving abroad.[15] However, there will be opportunities for skilled workers as demand for health professionals, STEM professionals, managers and those in the arts see a steep increase in demand over the next ten years. While this county relies heavily on agriculture in terms of its contribution to GDP, jobs in this sector are less likely to be affected by automation as agriculture already has higher levels of automation than in other counties.

Split-Dalmatia encompasses the city of Split, Croatia's second largest city, which is also an important business hub. As the region depends on tourism, the county has a significant share of workers in food services and customer services. By 2030, demand for office support and food services could fall by 22 percent and 24 percent respectively. As in other counties, these job losses are likely to be offset by a rise in demand for healthcare workers and professionals, STEM professionals, managers, and creatives (Exhibit 20).

[14] Tera Allas, Jonathan Dimson, Elizabeth Foote, and Barbara Jeffery, "The future of work: Rethinking skills to twackle the UK's looming talent shortage," McKinsey & Company, November 2019.

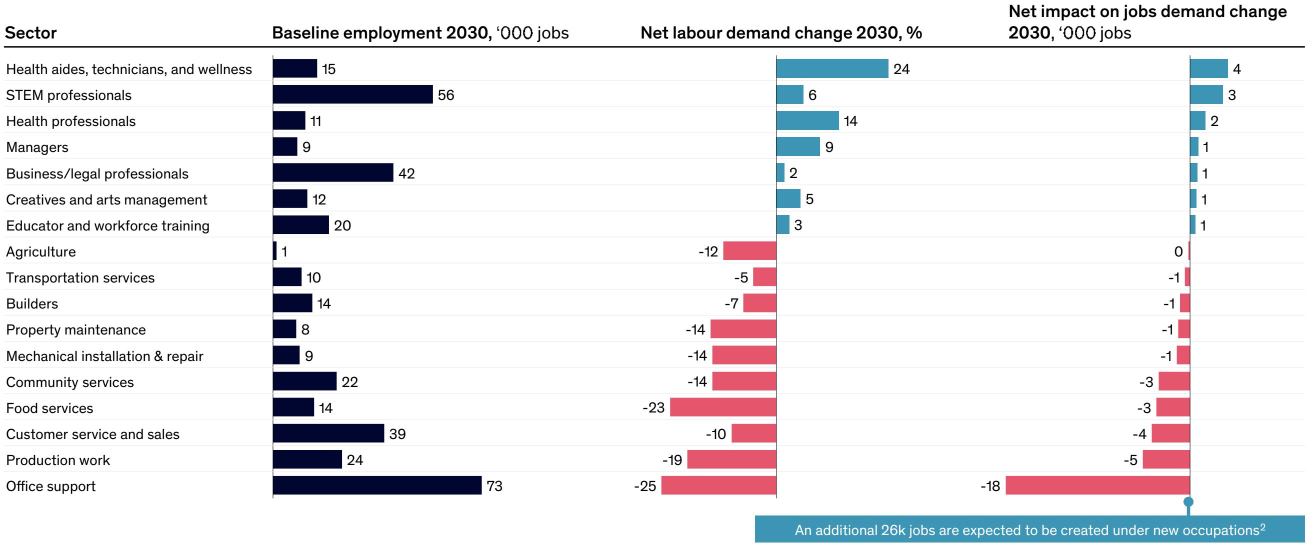
[15] Data from the Croatian Bureau of Statistics indicate that Osijek-Baranja had the third-highest unemployment rate in the country in 2018, 2019, and 2020, www.dzs.hr.

City of Zagreb

Exhibit 17

Demand for healthcare and STEM professionals is expected to increase the most while demand for office support workers could shrink by 25%

Net change in labour demand[1], post-COVID scenario



1. Net employment change compared to 2030 baseline employment

2. We assume new occupations are created every year at a rate of 0.56% of total employment (Jeffrey Lin, “Technological adaptation, cities, and new work,” Review of Economics and Statistics, volume 93, number 2, May 2011);

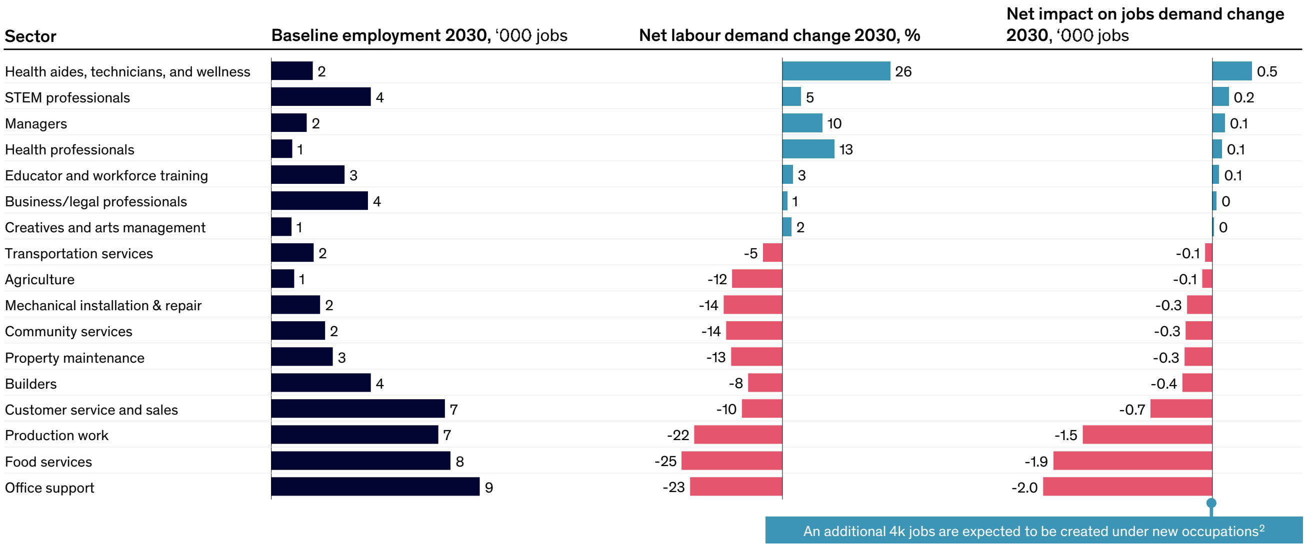
Source: Croatian Bureau of Statistics, O*NET, BLS, MGI Automation Model July 2021, MGI FoW post-COVID model, July 2021; McKinsey Global Institute analysis

Istria

Exhibit 18

Office support, food services, and production occupations could see up to 25% decline in demand

Net change in labour demand[1], post-COVID scenario



1. Net employment change compared to 2030 baseline employment

2. We assume new occupations are created every year at a rate of 0.56% of total employment (Jeffrey Lin, “Technological adaptation, cities, and new work,” Review of Economics and Statistics, volume 93, number 2, May 2011);

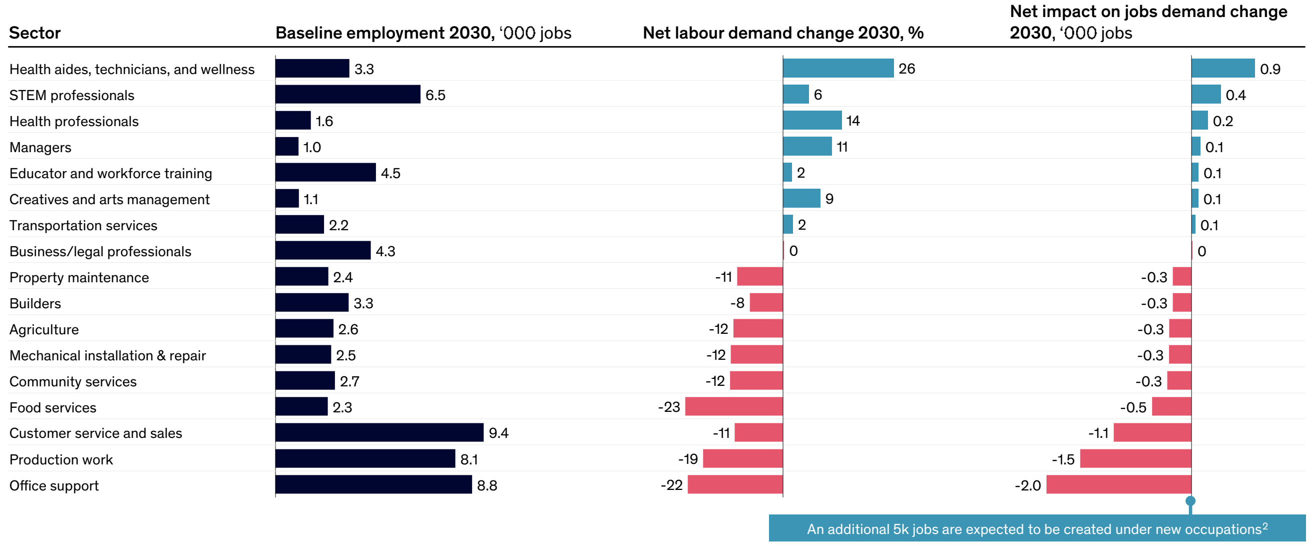
Source: Croatian Bureau of Statistics, O*NET, BLS, MGI Automation Model July 2021, MGI FoW post-COVID model, July 2021; McKinsey Global Institute analysis

Osijek-Baranja

Exhibit 19

Customer service and sales, production, and office support, top 3 employment share groups, could see highest fall in absolute demand

Net change in labour demand[1], post-COVID scenario



1. Net employment change compared to 2030 baseline employment

2. We assume new occupations are created every year at a rate of 0.56% of total employment (Jeffrey Lin, "Technological adaptation, cities, and new work," Review of Economics and Statistics, volume 93, number 2, May 2011);

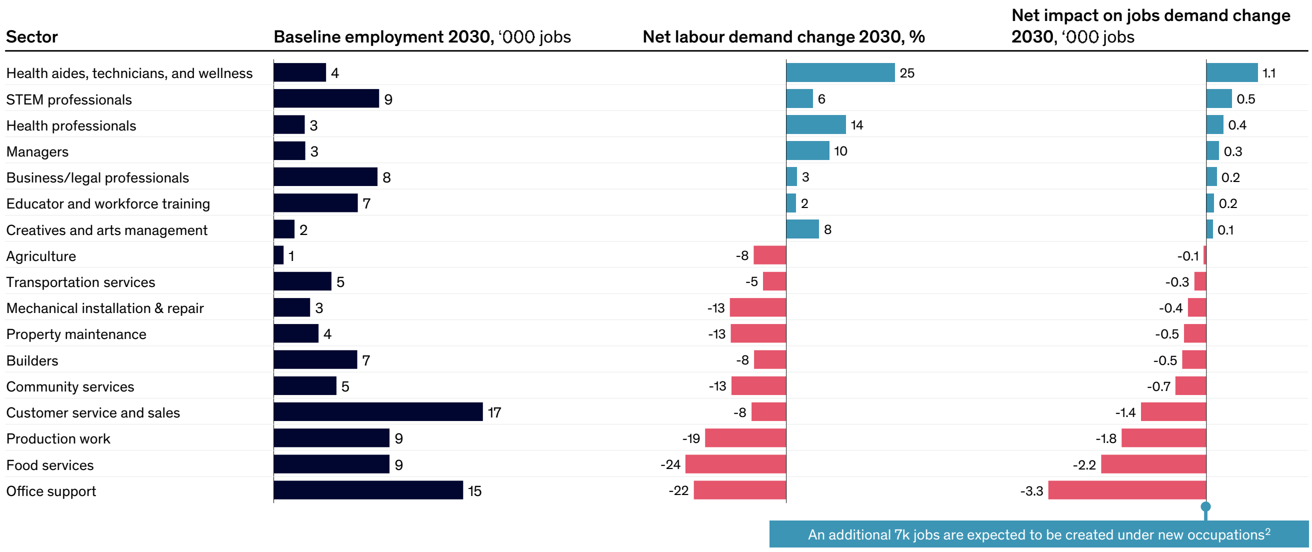
Source: Croatian Bureau of Statistics, O*NET, BLS, MGI Automation Model July 2021, MGI FoW post-COVID model, July 2021; McKinsey Global Institute analysis

Split-Dalmatia

Exhibit 20

Demand growth for healthcare occupations could be fastest while office support and food service workers' demand could shrink the most

Net change in labour demand[1], post-COVID scenario



1. Net employment change compared to 2030 baseline employment

2. We assume new occupations are created every year at a rate of 0.56% of total employment (Jeffrey Lin, "Technological adaptation, cities, and new work," Review of Economics and Statistics, volume 93, number 2, May 2011);

Source: Croatian Bureau of Statistics, O*NET, BLS, MGI Automation Model July 2021, MGI FoW post-COVID model, July 2021; McKinsey Global Institute analysis

4 Reskilling

Our analysis shows that 22 percent of hours worked in Croatia could be automated by 2030, resulting in displacement of roughly 340,000 workers of which 140,000 will require reskilling into new occupations by 2030. These workers may have to change their skills. This section looks at which skills are likely to be in high demand, and which are likely to decline in demand in the coming decade.

Although automation, AI, digital technologies, and COVID-19 could result in some job losses, gains in productivity, increased investment, and growth of the service economy are expected to create new jobs.

140k

will require reskilling into new occupations by 2030

Basic cognitive skills	Basic data input and processing Basic literacy, numeracy, and communication
Higher cognitive skills	Advanced literacy and writing Complex information processing and interpretation Creativity Critical thinking and decision making Project management Quantitative and statistical skills
Physical and manual skills	Craft and technician skills Fine motor skills General equipment operation and navigation General equipment repair and mechanical skills Gross motor skills and strength Inspecting and monitoring
Social and emotional skills	Adaptability and continuous learning Advanced communication and negotiation skills Entrepreneurship and initiative taking Interpersonal skills and empathy Leadership and managing others Teaching and training others
Technological skills	Advanced data analysis and mathematical skills Advanced IT skills and programming Basic digital skills Scientific research and development Technology design, engineering and maintenance

Exhibit 21

Skills transition analysis maps 25 skills across 5 categories to current and expected labour demand to estimate skills needed in future

1

We assess impact of automation at activity level to estimate job displacement (Automation diagnostic model)

~820 occupations
Across all sectors

Retail sales persons

~2,100 activities
10 activities for a retail sales person

Greet customers

Capabilities mix
18 capabilities

Fine motor skills/dexterity, Creativity

2

We examine the impact of 7 broadest & biggest macroeconomic trends and COVID impact trends on jobs demand

7 macroeconomic trends

Rising incomes

Ageing population

Technology investments

Infrastructure investment

Rising education levels

Energy efficiency and transitions

Marketization of unpaid work

COVID impact trends

Increased remote work

Lower business/work travel commute

Expansion of e-commerce

3

We map each activity to 25 skills across 5 categories to predict future skill transition (Skills shift model)

Physical and manual

Basic cognitive

Higher cognitive

Social and emotional

Technological

Source: Croatian Bureau of Statistics, O*NET, BLS, MGI Automation Model July 2021, MGI FoW post-COVID model, July 2021; McKinsey Global Institute analysis

~340k

of jobs likely to be displaced by 2030

While roughly 330,000 jobs are likely to be displaced by automation and COVID-19 trends, these are expected to be offset by 340,000 new jobs and occupations. While the number of jobs will likely remain constant, all workers could be affected by this transformation. It will be critical to equip the Croatian workforce with the skills needed to make this transition. We analyzed 25 skills across five categories and matched them to current and expected labour demand to estimate the skills likely to be needed in future (Exhibit 21).

We expect that automation and digitalization will have different effects on each of the five categories of skill sets. Any anticipated skills transition in a particular occupation is a factor of two variables—automation adoption and digitalization overlay. Automation adoption will displace the activity and skill, and hence increase the relative importance of other activities and skills which do not get displaced. Digitalization overlay, on the other hand, addresses the need for more technological skills, not only in jobs that are categorized as IT activities, but across all jobs and activities. Aptitude for working with digital technologies has increasingly become a core part of many jobs that are not typically thought of as IT jobs. For example, designers need to be able to work with computer-based design software, and their fluency with digital technology is a prerequisite.

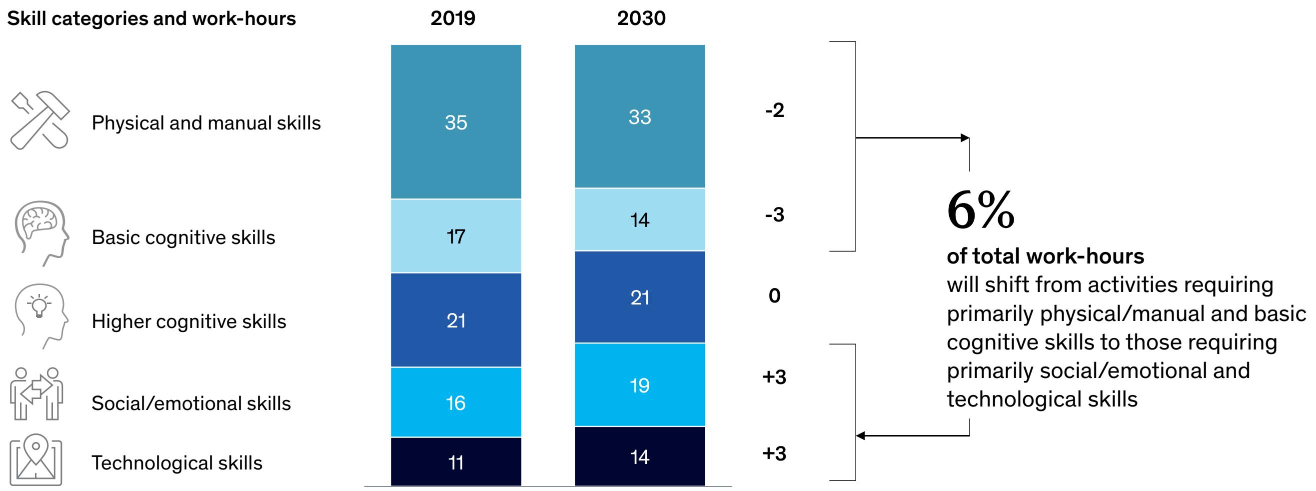
It is expected that there will be a decrease in time spent on physical, manual, and basic cognitive skills, while time spent on activities which rely on social, emotional, and technological skills will increase. Time spent performing tasks which require physical and manual skills, and basic cognitive skills, is expected to decrease from approximately 52 percent to 47 percent of work hours. Time spent on activities requiring socio-emotional and technological skills is expected to increase from 27 percent to 33 percent of work hours.

By 2030, 6 percent of total working hours could have shifted from performing tasks that require physical skills to those that require cognitive, socio-emotional and technological skills. Share of physical and manual skills, the category with the largest share of working hours in 2019, is expected to decrease by 2 percentage points. Similarly, we see a 3-percentage-point decrease in share of basic cognitive skills (Exhibit 22).

Exhibit 22

Increasing share of total work-hours will be spent on activities requiring socioemotional and technological skills

Share of activities dominated by specific type of skill in 2019 vs 2030 in Croatia, per post-COVID scenario[1]



1. Based on time spent on each skill in 2019 and 2030. We map each granular activity to the dominant skill required to perform that activity

Source: Croatian Bureau of Statistics, O*NET, BLS, MGI Automation Model July 2021, MGI FoW post-COVID model, July 2021; McKinsey Global Institute analysis

Within these two categories, specific skills such as those needed for operating equipment or basic data input and processing will likely see the greatest decline in employment share by 2030. This is expected, as predictable physical activities and data collection and processing activities are highly automatable. Overall, the share of time spent on higher cognitive skills will likely remain unchanged, although specific skills within this category may see shifts in demand. For instance, critical thinking and decision making stand out as skills most likely to be needed in the future. The demand for all socio-emotional skills should increase—interpersonal skills and empathy, in particular. There will also be an increase in demand for most types of technological skills (Exhibit 23).

Exhibit 23

Time spent on physical and manual skills and basic cognitive skills will shift towards socioemotional and technological skills

Percentage of skills required in 2019 vs 2030 post-COVID-19 scenario[1]

Fall in share | Rise in share

Category	Skill	Employment share 2019	Employment share 2030[1]	%change[2] (2019-30)
Physical and manual skills	General equipment operation and navigation	5%	4%	-19%
	General equipment repair and mechanical skills	4%	4%	1%
	Craft and technician skills	5%	4%	-13%
	Fine motor skills	6%	6%	-2%
	Gross motor skills & strength	11%	11%	-3%
	Inspecting and monitoring	4%	3%	-11%
Basic cognitive skills	Basic literacy, numeracy, and communication	7%	7%	-9%
	Basic data input and processing	9%	8%	-20%
Higher cognitive skills	Advanced literacy and writing	3%	3%	-16%
	Quantitative and statistical skills	2%	2%	-15%
	Critical thinking and decision making	6%	6%	9%
	Project management	5%	5%	-3%
	Complex information processing and interpretation	4%	4%	-6%
	Creativity	1%	1%	19%
Social and emotional skills	Advanced communication and negotiation skills	4%	5%	19%
	Interpersonal skills and empathy	2%	2%	28%
	Leadership and managing others	5%	6%	23%
	Entrepreneurship and initiative-taking	0%	1%	25%
	Adaptability and continuous learning	1%	1%	0%
	Teaching and training others	4%	4%	10%
Technological skills	Basic digital skills	5%	7%	34%
	Advanced IT skills and programming	1%	2%	14%
	Advanced data analysis and mathematical skills	1%	1%	-1%
	Technology design, engineering, and maintenance	2%	2%	15%
	Scientific research and development	1%	2%	14%

1. Based on time spent on each skill in 2019 and 2030. We map each granular activity to the dominant skill required to perform that activity.

2. Percentage increase/decrease in share of skills required in post-COVID-19 scenario, 2019–30

Source: Croatian Bureau of Statistics, O*NET, BLS, MGI Automation Model July 2021, MGI FoW post-COVID model, July 2021; McKinsey Global Institute analysis

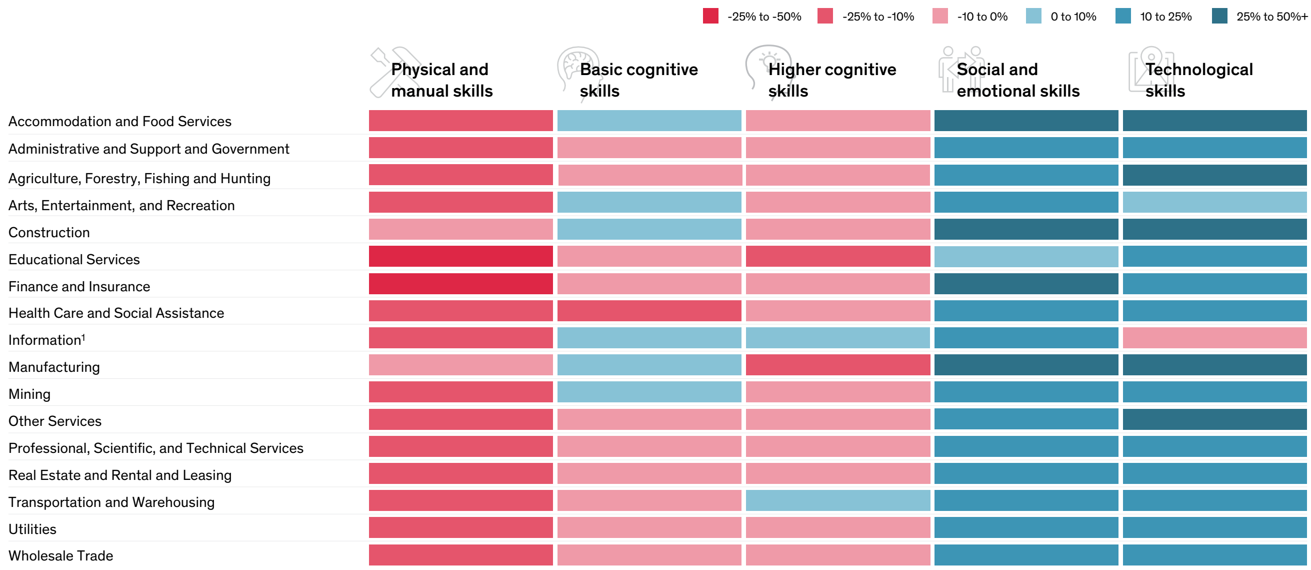
Almost every sector is expected to move away from the application of physical and cognitive skills towards socio-emotional and technological skills (Exhibit 24). The increase in socio-emotional skills, for instance in the accommodation and food services industries, draws attention to the importance of positive customer interaction. The increased need for such skills in healthcare and financial services largely results from the rise in the number of workers in those sectors and the number of hours worked.

Information sector (ICT) stands out as an anomaly. This is due to the fact that anticipated skills demand reflects the overall net labour demand dynamic in the sector. In the post-COVID-19 scenario, there is a 23 percent fall in labour demand in the information sector by 2030. Even though there will be an increase in demand for technological skills for the occupations which remain employed in the sector, the hours spent by the workers who would be displaced would outstrip the increased hours worked by those still employed.

Exhibit 24

Almost every sector is expected to move away from application of physical and cognitive skills and towards socioemotional and technological skills

% increase / decrease in share of skills required in post-COVID-19 scenario, 2019–30



1. Even though there will be increase in demand for technological skills for the occupations which remain employed in the sector; the hours spent by the workers who would be displaced or would not be in demand, would outstrip the increased hours demanded for technological skills by the workforce who is still in demand/or is expected to be employed in the sector. Hence, the lower technological skills hours demanded by 2030 compared to 2018

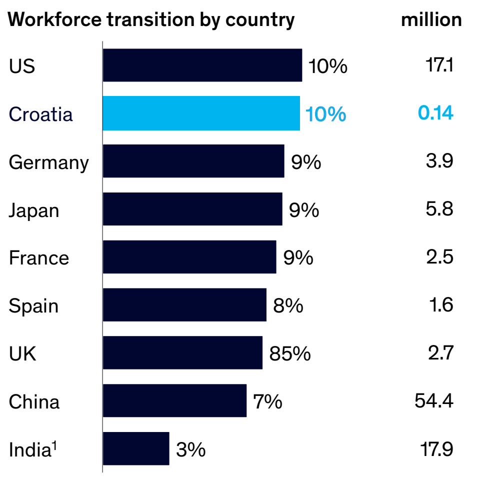
Source: Croatian Bureau of Statistics, O*NET, BLS, MGI Automation Model July 2021, MGI FoW post-COVID model, July 2021; McKinsey Global Institute analysis

Given these shifts in skills demand, workers may have to improve their skills, leveraging technology, or switch occupations by 2030 to remain employed. This represents roughly 10 percent of the workforce. Exhibit 25 details the occupations most likely to undergo transitions. These are largely made up of lower-skilled and lower-wage jobs that involve repetitive activities that are highly susceptible to automation.

Exhibit 25

Up to 140,000 Croatian workers may have to switch occupations by 2030 to remain employed

Workforce that may need to transition to new occupations by 2030, post-COVID scenario



Top occupations to transition

Occupations	Number of transitions[2], '000
Office clerks, general	12
Bookkeeping, accounting, and auditing clerks	11
Production workers	5
Procurement clerks	4
Tool and die makers	4
Waiters and waitresses	4
Retail salespersons	3
Billing and posting clerks	3

1. Excludes farm transitions; if farm jobs are included, transitions fall before the pandemic compared to after because there are fewer transitions to secondary and tertiary sectors.

2. Derived by subtracting the 2030 net demand from the 2030 baseline employment at occupation level across sectors

Source: Croatian Bureau of Statistics, O*NET, BLS, MGI Automation Model July 2021, MGI FoW post-COVID model, July 2021; McKinsey Global Institute analysis

The required workforce transformation presents opportunities for upskilling and reskilling.[16] Investing in talent will play an important role in preparing existing workers for the changes ahead, and in shaping the skills of the workforce of the future. The anticipated skills shift has implications for education, particularly around investment and aligning educational content to future needs.

Globally, the urgency of addressing skills gaps is clear. In the latest McKinsey Global Survey on reskilling, most respondents indicated that skill building (more than hiring, contracting, or redeploying employees) is the best way to close those gaps.[17] In fact, skill building is more prevalent than it was prior to the pandemic, with 69 percent of organizations doing more skill building now than they did before the COVID-19 crisis. The results also point to a shift in the most important skills to develop, which tend to be social and emotional in nature: for example, empathy, leadership, and adaptability.

69%

of organisations doing more skill building now than prior the pandemic

The survey also shows that basic digital skills have become a priority. As mentioned, Croatia is well placed to build on existing strengths to meet the growing demand for digital skills. The country has a solid foundation to build upon, including a strong ICT education system, a large pool of ICT graduates, and a generation of young Croatians with above-average digital skills. In addition to a good standard of digital education in schools, the country has introduced programs to enhance digital skills. For instance, the Croatian Makers program—the largest non-governmental educational program in the European Union—has supported the digital education of more than 150,000 children and educated more than 3,000 teachers free of charge.[18] More programs such as this will be required if Croatia is to grow its digital economy in line with its global peers.

Investing in a skilled workforce is imperative. The demand for undergraduate and postgraduate workers is expected to increase across Croatia by 2030. Labour demand for workers with just high-school qualifications will likely see a large decline, possibly as jobs usually performed by these workers will be automated. The technological and socio-emotional skills which will be in demand are associated with skills gained in higher education, and obtaining an undergraduate or postgraduate degree will be increasingly important in the future (Exhibit 26).

16 We define upskilling as acquiring new skills necessary or beneficial to a continued employment at the exact same or a similar job (to account for changes in processes and tools) or to advance within the ranks of one's employer (typically to a role requiring more managerial responsibilities). We define reskilling as acquiring a set of skills sufficient to transition to a completely new occupation.

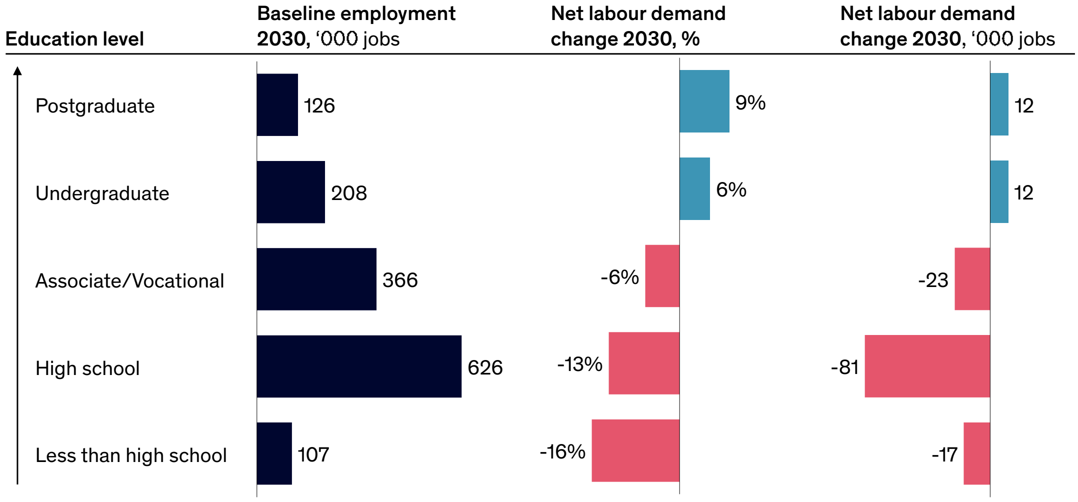
17 The online survey was in the field from December 8 to December 18, 2020, and garnered responses from 700 participants representing the full range of regions, industries, company sizes, functional specialties, and tenures. For more information, see "Building workforce skills at scale to thrive during—and after—the COVID-19 crisis," McKinsey & Company, April 2021, McKinsey.com.

18 "Digital challengers in the next normal," McKinsey & Company, 2020.

Exhibit 26

Driven by workforce skillset shifts, demand for undergraduate and postgraduate workers is expected to increase

Net change in labour demand[1], post-COVID scenario



97k

jobs are expected to be created under new occupations[2,3]

1. Net employment change compared to 2030 baseline employment
2. No additional information can be derived on required education level for new jobs which will be created
3. We assume new occupations are created every year at a rate of 0.56% of total employment (Jeffrey Lin, "Technological adaptation, cities, and new work," Review of Economics and Statistics, volume 93, number 2, May 2011);

Source: Croatian Bureau of Statistics, O*NET, BLS, MGI Automation Model July 2021, MGI FoW post-COVID model, July 2021; McKinsey Global Institute analysis

This country-wide trend affects each of the four counties in slightly different ways, according to the industries that are prominent in each area and general education levels. Of the four counties examined, the City of Zagreb will likely see the largest shift in demand for workers with undergraduate and postgraduate degrees. Additionally, of the 97,000 new jobs that are expected to be created in new occupations countrywide, 26,000 will likely be in Zagreb (Exhibit 27). Although it is not yet known what types of jobs these will be, they are likely to need skilled workers. Considering that the University of Zagreb is the top university in the country, the city will be well placed to provide graduates to fill the demand for a qualified workforce.

Istria has a large proportion of workers with high-school qualifications. This may correspond to the county's high numbers of workers currently employed in food services. The county is also highly dependent on tourism, and many of the workers employed in the sector may not have university degrees. Many of these workers will need to retrain or upskill by 2030 as the demand for university graduates increases (Exhibit 28). Higher-education opportunities are currently limited in the region, and many young people leave to study elsewhere, often in Zagreb or Rijeka. The county will likely have to draw on graduates from these areas to fill the anticipated demand for workers with undergraduate and postgraduate degrees. However, there is an opportunity for the region to create additional educational infrastructure to train and upskill the local workforce to meet future skills demand.

Similarly, Osijek-Baranja's workforce contains a large proportion of workers with high-school qualifications or vocational training. These workers may need to be retrained or upskilled as labour demand shifts towards workers with higher skills (Exhibit 29). There is an opportunity for educational institutions, policy makers, and businesses to collaborate in providing opportunities to educate, train and upskill these workers.

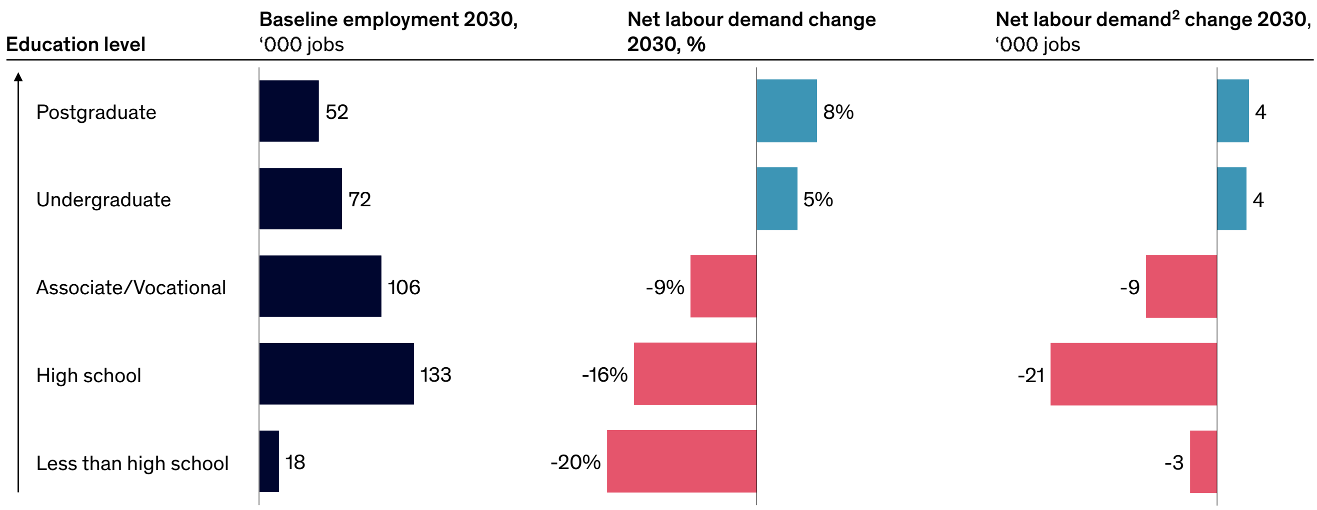
Future workforce trends are similar in Split-Dalmatia, which will see a marked increase in demand for those with postgraduate degrees (Exhibit 30). The University of Split will likely play an important role in supplying graduates to meet demand in the county. However, across Croatia, continued investment in educational infrastructure will be needed to assist universities in providing graduates with skills to match future demand, and to provide further education and training opportunities for the existing workforce.

City of Zagreb

Exhibit 27

Demand for undergraduate and postgraduate workers is expected to increase in the post-COVID scenario

Net change in labour demand[1], post-COVID scenario



1. Net employment change compared to 2030 baseline employment
2. An additional ~26,000 jobs are expected to be created under new occupations

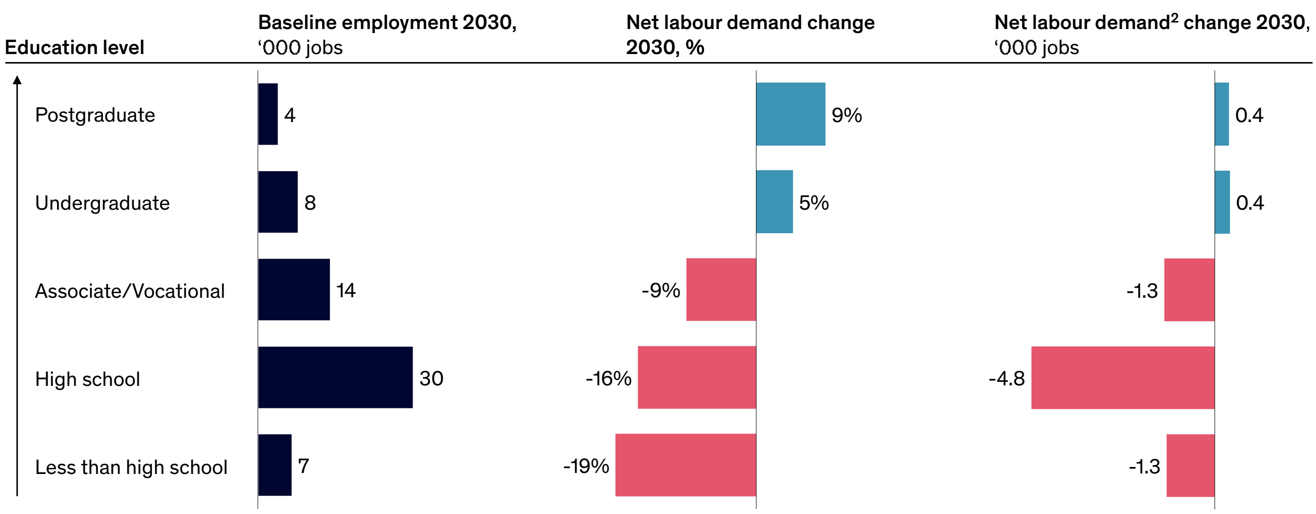
Source: Croatian Bureau of Statistics, O*NET, BLS, MGI Automation Model July 2021, MGI FoW post-COVID model, July 2021; McKinsey Global Institute analysis

Istria

Exhibit 28

Owing to the high percentage of high-school-educated workers in Istria, many workers will need to reskill in the next decade

Net change in labour demand[1], post-COVID scenario



1. Net employment change compared to 2030 baseline employment
2. An additional ~4,000 jobs are expected to be created under new occupations

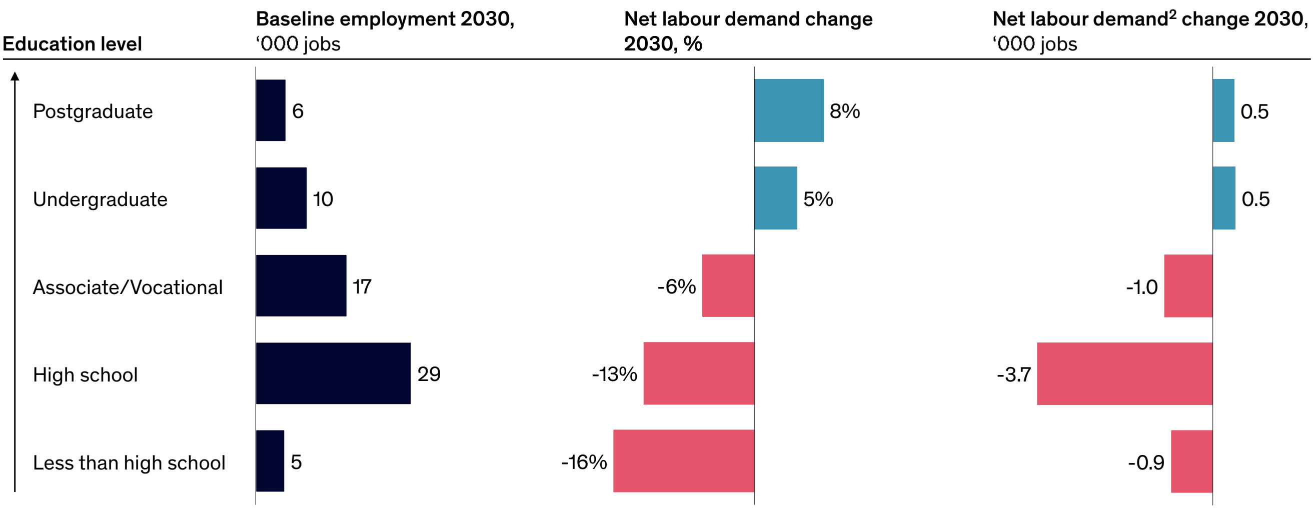
Source: Croatian Bureau of Statistics, O*NET, BLS, MGI Automation Model July 2021, MGI FoW post-COVID model, July 2021; McKinsey Global Institute analysis

Osijek-Baranja

Exhibit 29

Around 70% of all workers in Osijek-Baranja have high school or associate/ vocational education, which will be significantly affected by future labour demand changes

Net change in labour demand[1], post-COVID scenario



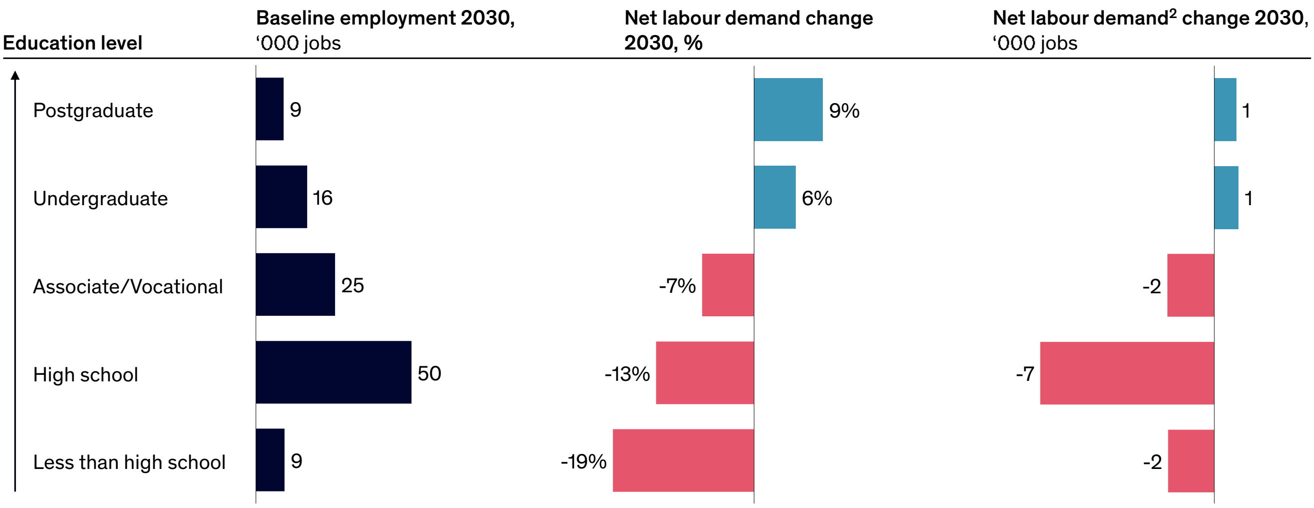
1. Net employment change compared to 2030 baseline employment
2. An additional ~5,000 jobs are expected to be created under new occupations
Source: Croatian Bureau of Statistics, O*NET, BLS, MGI Automation Model July 2021, MGI FoW post-COVID model, July 2021; McKinsey Global Institute analysis

Split-Dalmatia

Exhibit 30

Many high-school-educated workers in Split-Dalmatia will need to reskill until 2030

Net change in labour demand[1], post-COVID scenario



1. Net employment change compared to 2030 baseline employment
2. An additional ~7,000 jobs are expected to be created under new occupations
Source: Croatian Bureau of Statistics, O*NET, BLS, MGI Automation Model July 2021, MGI FoW post-COVID model, July 2021; McKinsey Global Institute analysis

97

thousand new jobs in new occupations are expected to be created countrywide

Methodology

We used MGI's workforce skills model, which defines a set of 25 skills in five categories: physical and manual, basic cognitive, higher cognitive, social and emotional, and technological.

We mapped these skills to individual work activities by assigning each of the 2,000 workplace activities from the US Department of Labor's O*NET database to a specific skill required to perform the activity. While in reality workers use multiple skills to perform a given task, for the purposes of our quantification we identified the main skill used. For example, in banking and insurance, we mapped "prepare business correspondence" and "prepare legal or investigatory documentation" to the skill "advanced literacy and writing" in the category of higher cognitive skills. In retail, we classified "stocking products or parts" into gross motor skills and strength in the category of physical and manual skills, while "greeting customers or visitors" is mapped to basic communication skills in the basic cognitive category.

To quantify skills, we looked at the number of hours workers spend performing the activities mapped to that skill. To allocate a specific number of hours to each activity, we combined data on the frequency of each activity in O*NET with the overall number of hours worked in a given occupation. As the number of hours in each activity (by country and by sector) changes with automation and future job growth, so does the number of hours spent exercising different skills.

5 Priorities for comprehensive talent transformation

Automation and digitalization are here to stay, and have the potential to increase productivity and profitability in many industries. While automation, AI, and digital technologies bring opportunities for Croatia, they also pose challenges—particularly around job displacement and building a workforce with the skills required for future occupations. Taking steps to identify these challenges, and address them, is critical for building a productive and competitive workforce and ensuring long-term growth. While many Croatian business leaders believe that automation has the potential to build a more productive workforce, and a more competitive economy, there are concerns about widening income inequality if automation takes place too quickly, or without addressing the needs of workers whose jobs may be displaced.As is the case in other EU countries, all Croatian stakeholders must seek to balance the pace of automation and reskilling if the country is to reap the benefits of automation and new technologies. If automation and digitalization happen too fast, there is a possibility that the new jobs they create might go unfilled. This could potentially result in worsening income inequality. On the other hand, if automation and digitalization happen too slowly, there is a possibility that Croatia's competitiveness and economic growth could suffer.

All key stakeholders—businesses and associations, public institutions, educational institutions, and individuals—have a role to play in achieving the talent transformation required to ensure that Croatia is prepared for the changes in the coming decade.

McKinsey research shows that an ecosystem approach that brings together businesses, policy makers, educators, and other stakeholders might prove more effective than isolated efforts at addressing workforce challenges, based on past experience. Company initiatives to reskill workers are more robust when supported by educational institutions. The work of educators and social enterprises in training workers in more sought-after skills is most effective when coordinated with efforts by government agencies aligned to company needs. A closely coordinated, comprehensive response could help more workers make the challenging job transitions ahead.[19]

In this section, we discuss what each stakeholder can do to benefit from the opportunities created by automation, AI, and digital technologies and to overcome the related challenges. We also highlight some Croatian success stories with examples of IT companies that have flourished in recent years.

[19] "The future of work after COVID-19," McKinsey Global Institute, February 2021.

5.1 Businesses and associations

Our analysis shows that automation and digital technologies will bring significant changes to most occupations. Accordingly, businesses and public institutions may need to rethink their business and operating models, from organization to infrastructure. They may also need to embrace automation, AI, and digitalization through pursuing large-scale transformations.

Sometimes, it is possible for a small start-up to disrupt an entire industry. Croatia has strong potential for growth in the digital arena and is home to a number of rising stars in the tech sector. For instance, Infobip is Croatia's first unicorn. The software start-up was founded in 2006, and provides technology in omnichannel marketing, allowing companies to communicate with customers through text messages or third-party apps such as WhatsApp. In 2020, Infobip raised over $200 million from private equity firm One Equity Partners in a deal which valued the company at over $1 billion.[20]

In another Croatian success story, Nanobit began without any capital, and only two computers, but with the will to gain global success in the very competitive mobile-gaming industry. Today, Nanobit's games have been downloaded more than 145 million times and are played by more than 10 million players worldwide on a monthly basis. In 2020 the company was sold to Stillfront for $148 million.[21]

Croatian firm Microblink has harnessed the power of AI, particularly machine learning, to build a number of innovative products. Microblink builds proprietary computer-vision technology optimized for real-time processing on mobile devices. This technology has many applications such as learning tools for students and data-input devices for businesses that eliminate the need for manual data entry.[22] For instance, in 2014, Microblink team launched Photomath, a mobile app with close to 250mn downloads that helps students learn how to solve mathematical equations. They successfully raised $23 million when the app reached 220 million downloads.[23]

Whether building a tech start-up for an increasingly digital world, or embracing technology to transform business processes, companies need to adapt to the trends shaping the business environment. All companies can take steps to begin their transformation journeys, and ensure that they have a workforce that is equipped with skills necessary for future needs. For instance, businesses and associations can conduct strategic workforce planning, launch training programs, and adopt more agile and efficient working models.

20 Krystal Hu, "Exclusive: European software startup Infobip raises over $200 million in Series A funding – sources," Reuters Technology News, July 30, 2020, www.reuters.com.
21 Lauren Simmonds, "Background of Croatian company Nanobit's sale to Swedes," Total Croatia News, September 20, 2020, total-croatia-news.com.
22 Microblink website, microblink.com.
23 Roman Dillet, "Microblink launches Photomath to solve math equations with a phone," Tech Crunch, October 20, 2014, techcrunch.com.

Strategic workforce planning
As a first step, companies could conduct strategic workforce planning to prepare a road map for talent transformation. Workforce planning is critical for identifying roles and skills that will be needed in the future, and for finding ways to develop or attract the right talent to fill these roles. Using sophisticated workforce planning tools and predictive analytical models to plan for talent acquisition could be beneficial.

For example, a global aerospace and defense company wanted to ensure that it was equipped with the necessary critical skills to achieve its long-term strategic business goals. However, the company had no consistent and reliable methodology to identify those skills or to forecast workforce supply and demand. The company used predictive analytics and past employee-attrition data to forecast its five-year workforce supply. It built a workforce demand model based on its long-term business goals and external data from sources such as LinkedIn. This application created a standardized approach to setting hiring plans in critical skills across business units and functions.[24]

Having assessed existing and anticipated skills needs, companies can then make targeted investments focused on reskilling and upskilling employees or acquiring new talent. **Talent-transformation programs**

Companies can acquire the skills they need through different types of talent programs. These include hiring new talent, upskilling employees, collaborating with other stakeholders to redeploy employees, and forming public–private partnerships to address wider reskilling efforts. In Europe, the European Round Table for Industry (ERT), has announced the "Reskilling 4 Employment" programme, which has committed to helping public sector organisations and training providers retrain 5 million people by 2030. National governments could try to catalyse similar coalitions to help their national reskilling ecosystems take shape and scale."

To develop technological skills, businesses should focus on adding positions that require knowledge of data analytics and technologies and invest in IT professionals and data scientists.

Companies can build new skills among existing employees through in-house training programs such as corporate academies or by partnering with external institutions to improve employee capabilities through upskilling.[25] For instance, Amazon has pledged to spend $700 million on technology training by 2025 to help 100,000 employees move to higher-skill jobs, and professional-services company ManpowerGroup has entered a partnership with education company Pearson and others to upskill 130,000 workers over the next five years.[26]

Companies can help workers acquire skills they needed for new jobs and create career pathways with upward mobility. Retraining existing employees with proven track records is typically far more cost effective than hiring new people. For instance, Walmart operates internal academies to develop the best hourly workers into store managers and, more recently, supply chain professionals and technology specialists.[27]

During the COVID-19 pandemic, some UK employers found creative solutions for redeploying and reskilling staff instead of reducing the size of their workforce. A key lesson here is that jobs that seem unrelated may have deep similarities that can be leveraged. For example, a partnership between trade body Airlines UK and social-care company Cera includes a scheme to reskill 1,000 cabin crew in the sought-after role of carers. Though the roles are in different industries, their similarities permit reskilling to be as short as ten days.[28] One former cabin-crew member trained by Cera remarked that she had entered her new position as a carer already accustomed to a customer-facing working day, and to identifying and assisting with medical emergencies.[29]

---

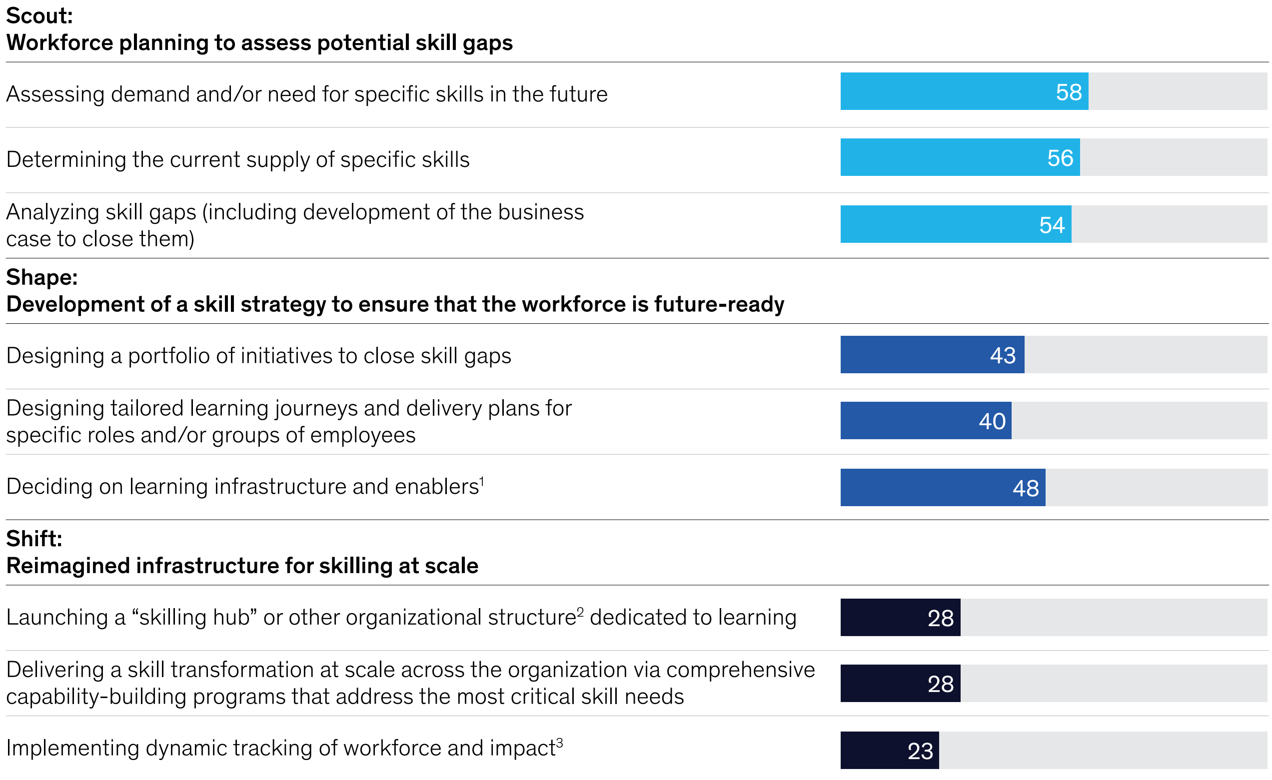
24 "Future of work: Turkey's talent transformation in the digital era," McKinsey & Company, January 2020.
25 "Skill shift: Automation and the future of workforce," McKinsey Global Institute, May 2018.
26 Kweilin Ellingrud, Rahul Gupta, and Julian Salguero, "Building the vital skills for the future of work in operations," McKinsey & Company, August 2020.
27 "The future of work after COVID-19," McKinsey & Company, 2021.
28 Jill Rennie, "Home care agency to retrain redundant airline staff in new recruitment drive," Homecare, May 28, 2020, homecare.co.uk. For more information, see Tera Allas, Will Fairbairn, and Elizabeth Foote, "The economic case for reskilling in the UK: How employers can thrive by boosting workers' skills," McKinsey & Company, November 2020.
29 Claudia Tanner, "'I want to make a difference': 1,000 cabin crew staff who've lost jobs due to coronavirus to be retrained as

McKinsey research shows that the successful design and implementation of skill transformations is difficult to get right. The following framework for building workforce skills during COVID-19 relies on nine key practices that all need to be applied properly. In fact, the more of these nine practices a company pursues, the higher its overall likelihood of an effective transformation. The nine practices support three different phases of a skill transformation.[30] The first phase consists of rapid workforce planning to identify skill gaps, which involves comparing the company's current supply of skills with the demand for certain skills, based on its strategic ambition, digital agenda, and overall business model. The second phase focuses on how companies shape the skill strategy to close anticipated gaps by finding the right mix of actions (that is, building skills as well as redeploying, hiring, contracting, and releasing employees). The third phase involves the execution and delivery of skill-building efforts at scale across the organization (Exhibit 31).

Exhibit 31

The nine key practices support three different phases of a skill transformation

% of respondents who say their companies have successfully implemented each practice



[1]That is, specific technologies to use.
[2]For example, that conducts skill and fit assessments, matches talent to new roles, and redeploys people accordingly.
[3]For example, return on investment and impact on business outcomes.

carers," ienews, June 10, 2020, inews.co.uk.
[30] "Building workforce skills at scale to thrive during—and after—the COVID-19 crisis," McKinsey & Company, April 2021.

New working models

In the coming decade, businesses and government organizations may need to transform more than their approach to talent. The changes that increasing automation and digitalization will usher in may require more flexible and efficient working models. Many leading Croatian companies are already taking an agile approach in response to the rapidly evolving environment.

If an organization is to adopt new ways of working, a change in mindset is critical. This is hard to accomplish without a common purpose and a people-centered culture. McKinsey's research on agility shows that successful agile organizations have the following factors in common: a network of teams within a people-centered culture that operates in rapid learning and fast decision cycles which are enabled by technology, and a common purpose that co-creates value for all stakeholders.[31]

Adopting an agile working model could facilitate company transformation. This approach can help companies quickly reshape strategies, products, and processes. McKinsey research has found that 70 percent of agile companies rank in the top quartile of organizational health, compared with 17 percent of bureaucratic companies. Considering that "healthier" companies create far more long-term total benefits to shareholders, the imperative to become more agile is clear.[32] Such companies achieve greater customer focus, faster time to market for products, higher revenue growth, lower costs, and a more engaged workforce.

Agile organizations have five trademarks—strategy, structure, process, people, and technology:[33]

- Strategy should define a shared purpose for the company and shift the mindset from "capturing" value to "co-creating" it for a broader list of stakeholders—for example, employees, suppliers, and communities.
- Companies can turn their organizational structure into a leaner one, ensure that roles are clear and accountable, and facilitate governance.
- Processes should be standardized and focus on rapid iteration and experimentation, often in the form of projects that see teams produce a single deliverable in a short time. Processes should also be supported with transparent information flows.
- Employees can be empowered by giving them full authority and accountability over the tasks that they perform. This is an important way to ignite employees' passion for their jobs and the company.
- Technology should be integrated into the core of the organization as a means of enabling quick reactions to business needs.

[31] Wouter Aghina, Karin Ahlback, Aaron De Smet, Gerald Lackey, Michael Lurie, Monica Murarka, and Christopher Handscomb, "The five trademarks of agile organizations," McKinsey & Company, January 2018.
[32] Michael Bazigos, Aaron De Smet, and Chris Gagnon, "Why agility pays", McKinsey Quarterly, December 2015.
[33] "Future of work: Turkey's talent transformation," McKinsey & Company, 2020.

5.2 Public institutions

Businesses may be at the forefront of automation adoption, and managing the labour shift, but public institutions have an important role to play in raising productivity levels and ensuring sustainable, inclusive economic growth. Public institutions could embrace the opportunity for their economies to benefit from the productivity growth potential and put in place policies to encourage investment and provide incentives to encourage continued progress and innovation. At the same time, they could evolve and innovate policies that help workers and institutions adapt to the impact on employment. This will likely include rethinking education and training, income support and safety nets, as well as transition support for those dislocated.[34] Additionally, public institutions can work with other stakeholders to develop frameworks for managing workforce transitions. They can also support the development and deployment of automation and AI technologies through investment in basic and applied research and through building digital infrastructure.

Public institutions can contribute to Croatia's talent transformation, and economic growth, by defining a countrywide workforce plan, identifying priority areas, and addressing regional differences.

[34] "A future that works: automation, employment, and productivity," McKinsey Global Institute, January 2017.

Geographical and sectoral labour-force planning

Public institutions could plan a countrywide workforce strategy, establish priorities, and set the vision for Croatia's workforce and skills transformation. For example, in the US state of Washington, a task force composed of legislative, labour, and business members seeks to identify policies that help businesses and workers thrive in a fast-changing world.[35] And the Canadian government established and finances the Future Skills Centre, a diverse consortium of experts that identifies skills newly in demand and helps citizens acquire them.[36]

Public institutions can bring a broader perspective to bear on macroeconomic trends, and collaborate with businesses and educational institutions to assess specific needs in specific areas. Croatia is likely to see the highest increase in labour demand in the healthcare, arts, entertainment, recreation, and financial sectors. All four counties could see an increase in demand for health professionals, STEM professionals, managers and educators. There may also be an increase in demand for creative occupations and arts management. Overcoming shifts in the labour market will need different solutions for each region. A transformation of skills is needed to match the transformation of activities in each county.

Given the current occupational mix, automation adoption will have different effects in different counties—and public institutions, and educational institutions, can collaborate with businesses to assist in skills transformation. For instance, in Zagreb, demand for office support workers and food-services labour could see a significant decrease while demand for STEM and healthcare professionals will see a significant increase. Zagreb may also see the largest shift in demand for workers with undergraduate and postgraduate degrees. As Zagreb is home to the highest-ranked Croatian university, the city is well placed to meet the increased demand for graduates.

In Osijek-Baranja, the three occupations that currently have the highest share of employment—customer service and sales, production, and office support—could see highest decline in absolute demand. The county's high percentage of workers with high-school qualifications or vocational training will need to invest in retraining or upskilling opportunities as labour demand shifts towards workers with higher skills. The country is expected to see an increase in demand for healthcare professionals, managers, and those in creative professions.

Istria also has a large proportion of workers with high-school qualifications. This may correspond to the county's high numbers of workers currently employed in food services or office support roles. Many of these workers will need to retrain or upskill by 2030 as the demand for university graduates increases. As in other counties, demand for healthcare workers and healthcare professionals will increase over the coming decade.

Split-Dalmatia has a significant share of workers in food services and customer service, owing to the region's dependency on tourism. The University of Split may play an important role in supplying much-needed graduates to meet future skills demand.

Our model assumes that 97,000 new occupations will emerge throughout Croatia over the next decade. Of these, 42,000 will be spread across the four counties analyzed in this report, as follows: Zagreb 26,000; Istria 4,000; Osijek-Baranja 5,000; and Split-Dalmatia 7,000. It is not yet clear what sectors or industries these occupations are likely to fall under. But these are likely to require digital skills. Education is critical to prepare graduates for occupations in sectors that are expected to show an increase in demand, and for new jobs that are likely to be digital—and public institutions have a role to play in assessing the skills transformation required.

[35] Future of work: What lies ahead?, Washington Workforce Training & Education Coordinating Board, July 2019.
[36] "Preparing Canadians for the changing economy and future of work," Future Skills Centre, fsc-ccf.ca.

Centers of development and technology

Public institutions could identify priority areas for reform and rally public and political support for automation and digital-transformation initiatives. They could also consider establishing dedicated mechanisms to enable a holistic view and coordinate implementation of priority areas for reform.

Croatia has already taken steps in this direction. The Croatian government recently set up a taskforce to define the framework for cooperation with Infobip regarding AI. This collaboration is aimed at accelerating digital transformation in the economy, education, science, tourism and public administration and to create the preconditions to position Croatia as the center of AI development in the European Union.[37]

As a recent Digital Economy and Society Index report indicates, Croatian enterprises are progressively integrating digital technologies into their businesses. With 23 percent of enterprises at a high or very high level of digital intensity, Croatia is slightly below the EU average of 26 percent. And, despite growing demand from employers, the supply of ICT specialists in Croatia is below the EU average.[38] Public-sector institutions could play a role in setting up centers of excellence to further IT skills training.

Accelerating mechanisms and incentives

Just as governments provided crisis support to businesses and individuals during the COVID-19 pandemic, they can incentivize several important shifts that will help reshape economies to be more productive and equitable when building a workforce for the future. During the pandemic, the Croatian parliament adopted a package of government-sponsored bills valued at almost €3.9 billion euro to help the economy, with 63 measures primarily aimed at preserving jobs and ensuring payment of wages.[39]

Policy makers could consider new ways to modernize and strengthen the social safety net to support people transitioning between jobs or facing significant wage cuts because of automation. Support could take many forms, including more flexible income-support programs, relocation assistance, training grants, increased minimum wages, and reformed tax systems.[40]

Public institutions can also provide incentives for redeployment and reskilling. In return for financial support during the COVID-19 crisis—such as subsidies and tax rebates—governments required businesses to invest in training and upskilling their workforces. In Germany, for example, the recent Qualification Opportunities Act provides for government subsidies of companies' employee-training programs, with smaller businesses receiving proportionally greater subsidies. Up to 100 percent of training costs for microbusinesses and up to 50 percent for SMEs are covered by subsidy. Governments can also achieve other objectives, such as increasing registration of informal businesses and improving female participation in the economy, in return for financial support.[41]

Public institutions could also develop programs to identify advanced technology sectors and provide incentives to increase automation adoption. For example, affected sectors could benefit from accelerating depreciation on technology assets and R&D tax credits. These efforts could also help promote the development of advanced technologies locally, which could create even more jobs.

[37] "Government sets up task force for cooperation with Infobip on AI," Government of the Republic of Croatia, May 20, 2021, vlada.gov.hr.
[38] DESI 2020 Croatia.
[39] COVID-19 and the world of work, Country Policy responses, International Labour Organization, www.ilo.org.
[40] "The future of work after COVID-19," McKinsey & Company, 2021.
[41] David Fine, Julia Klier, Deepa Mahajan, Nico Raabe, Jörg Schubert, Navjot Singh, and Seckin Ungur, "How to rebuild and reimagine jobs amid the coronavirus crisis," McKinsey & Company, April 2020.

5.3 Educational institutions

Educational institutions have a significant role to play in equipping future generations with new skills. They also have a critical role to play in collaborating with other stakeholders to set out guidelines and frameworks for how to empower existing workers with new skills. Three areas Croatian educational institutions can address are updating education and training models, improving the learning experience, and enhancing opportunities for lifelong learning.

Updating the educational model

Educational institutions have an opportunity to collaborate with businesses and other key stakeholders to adjust school or university curricula to equip future generations with skills that are likely to be in high demand. As mentioned, Croatia is well placed to build on existing strengths such as its strong ICT education system and a young population already equipped with above average digital skills. To build on these strengths, educational institutions could identify and implement programs to address known skill gaps. For instance, relevant classes could be made compulsory at appropriate levels. Universities and educational institutions could also create programs tailored to future skills that are available to adults through seminars, certificate programs, and online training. Relevant stakeholders such as public institutions or companies could provide financial contributions proportional to their gains through shared financing. [42]

Croatian universities and the private sector are already collaborating to prepare for a shift in digital skills. For example, the Faculty of Electrical Engineering and Computing at the University of Zagreb recently announced a new collaboration with insurance company Croatia osiguranje on a new program that specializes in the use of information technology in insurance companies. The program was created to improve the understanding and use of new technologies in insurance and to respond to existing and future market demands.[43]

In another innovative initiative, the Faculty of Mechanical Engineering and Naval Architecture at the University of Zagreb established the Regional Center of Excellence for Robotic Technology (CRTA) in 2006. The center's activities are directed towards the research and development of advanced robotic applications in manufacturing and medicine, where traditional automation and human labor need to be replaced by flexible, versatile and adaptive robotic systems. CRTA has completed many projects focused on modern manufacturing requirements, for instance project IGRAMO improved robotic grasping movements by predictions based on observation of humans doing the same work. This project showed improved efficiency in how robotic systems handle objects and has benefits for entire production systems made up of robots and manipulators.[44]

The University of Zagreb is also pioneering the first university program for video-game design and development. The program is a joint venture between five university faculties: Electrical Engineering and Computing, Fine Arts, Organization and Informatics, Architecture, and Dramatic Arts. The program is being developed through the broader Edu4Games project, which includes a range of lifelong learning programs in the field.[45]

Improving the learning experience

To meet the anticipated skills shift, the classroom experience could be more personalized, moving from traditional content on traditional schedules to a focus on building job skills anytime, anywhere. The new learning experience can be built through collaboration with community centers and experts, using project-based learning and rapid prototyping, with a focus on problem-solving skills.

In an era of digitalization, it is critical to conduct field research and create a predictive database of skills in order to redesign the content, method, frequency, and target audience of training programs in the most efficient and results-oriented manner. Training initiatives could be created to allow a balanced approach to the changing needs of students, youth, and employees, addressing issues related to, for example, gender equality, equality of opportunity, disadvantaged groups, geographical conditions, age, or education level.

42 OECD Employment Outlook 2019: The future of work, OECD, April 2019.
43 "Croatia osiguranje and FER have created a new study," Telegram, February 11, 2021, www.telegram.hr.
44 CRTA website, crta.fsb.hr.
45 Piše Hina, "Suradnja 5 fakulteta: U Zagrebu se osniva uzbudljivi novi studij dizajna i razvoja videoigara," 24SATA, May 2021, 24sata.hr.

Creating lifelong learning opportunities
Lifelong learning is becoming increasingly important as workers may need to continuously update their skills to meet shifts in technologies, occupations, and job requirements. Singapore provides an example of an initiative to encourage lifelong learning. The country's SkillsFuture program opens an account for every citizen over 25 years old, who can draw on the account to cover the fees for more than 25,000 courses.[46]

The Croatian government recently announced that it plans to provide further education for approximately 30,000 employed and unemployed citizens. A pilot project for reskilling adults through vouchers to spend on education, which should later become a permanent model of educating adult citizens, has been included in the state National Recovery Program. The program will be similar to the French model of adult education, which is known as one of the best in the European Union. Currently, a list of 80 programs and skills that are in short supply in the domestic labour market has been compiled, with an emphasis on "green and digital" skills.[47]

5.4 Individuals

Companies, public institutions, and educational institutions are key actors in adopting automation and digital technologies and ensuring effective workforce transitions, but individuals have a role to play in deciding their futures. It is critical that all stakeholders work together to assess the types of skills likely to be in demand, and the education or training needed to acquire them, and provide these opportunities to individuals.

In the face of the changes driven by automation, AI, and digital technologies, all stakeholders should empower individuals to embrace continuous learning and self-development, invest in social and technological skills, and adopt flexible career paths.

Continuous learning and self-development
Business leaders will need to provide learning and development opportunities to advance individual career paths, and upskill or retrain workers whose jobs may be displaced. Leaders can also teach their teams to learn, to be curious, and to create a continuous learning culture within the organization. Lifelong learning is becoming a reality in a rapidly shifting world of work. Public institutions and educational institutions need to ensure that appropriate programs are designed to upskill workers at all stages of their careers.

Social and technological skills
In the era of automation, individuals must be given opportunities to focus on developing socio-emotional skills (including interpersonal skills, empathy, leadership, entrepreneurship, and initiative-taking), technological skills (such as basic digital skills, and advanced IT skills and programming), and higher cognitive skills (such as creativity, critical thinking, and decision making). Business leaders will need to prepare their organizations for building such capabilities, and individuals should be encouraged to enroll in courses and training opportunities that teach relevant skills.

Lifelong flexible career paths
With the rise of the gig economy, many workers are turning to freelance work instead of traditional full-time employment. COVID-19 accelerated this trend and many individuals now need to adopt an entrepreneurial approach to their careers as part-time jobs and independent, project-based work becomes more common. However, businesses and public institutions shall ensure that there is adequate support for these types of workers.

[46] SkillsFuture, myskillsfuture.sg.
[47] "Država će svima koji žele dijeliti vaučere za dodatno obrazovanje," Večernji list, 12 April 2021, vecernji.hr.

Prepared By:

Tomislav Brezinscak

Dino Komar

Marko Radenovic

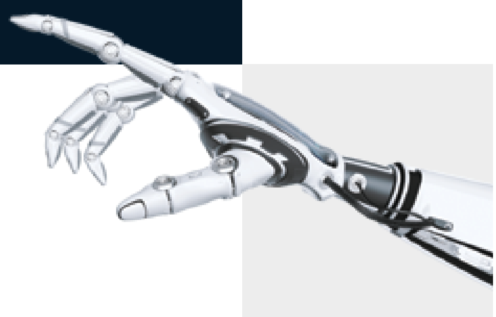
Paulo Katic

Brane Petrovic

Gurneet Singh Dandona

Alok Singh

McKinsey & Company Adriatic would like to thank the many area experts from the public, private and social sectors including the Croatian Ministry of Labour, Pension System, Family and Social Policy as well as the Tax Administration who provided insights and source data, and helped advance our thinking.



Designed by Visual Media Europe - Adriatic
October 2021

October 2021