

Unleashing the Skills Economy

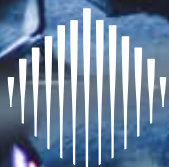
How Governments can Turn Labor
Market Threats into Opportunities
in the Digital and Green Age

**WORLD
GOVERNMENT
SUMMIT 2022**

in collaboration with



pwc



To Inspire and Enable The Next Generation of Governments

The World Government Summit is a global platform dedicated to shaping the future of governments worldwide. Each year, the Summit sets the agenda for the next generation of governments with a focus on how they can harness innovation and technology to solve universal challenges facing humanity.

The World Government Summit is a knowledge exchange center at the intersection of government, futurism, technology, and innovation. It functions as a thought leadership platform and networking hub for policymakers, experts and pioneers in human development.

The Summit is a gateway to the future as it functions as the stage for analysis of future trends, concerns, and opportunities facing humanity. It is also an arena to showcase innovations, best practice, and smart solutions to inspire creativity to tackle these future challenges.



القمة WORLD
العالمية GOVERNMENT
للحكومات SUMMIT

القمة WORLD
العالمية GOVERNMENT
للحكومات SUMMIT

القمة WORLD
العالمية GOVERNMENT
للحكومات SUMMIT

القرقاوي
-GERGAWI

مسك
MUSK



“ Live as if you were to die tomorrow. Learn as if you were to live forever. ”

- Mahatma Gandhi

Table of Contents

Topics

Acknowledgments	06
Authors	06
Executive Summary	07
Introduction	11
The Risks and Opportunities of the Twin Transitions	13
Country Readiness for Smart Green Growth	21
Solving the Upskilling Puzzle	26
How Governments can Unleash the Skills Economy	37
Conclusion	49
Appendix	51



Acknowledgments

The authors would like to thank the following experts for their insights during our interviews:¹

Vickie Dekocker, co-author of The Learning Society

Margareta Drzeniek, Horizon Group, author of the 2020 UN report “Future Possibilities”

Ekkehard Ernst, Chief Macroeconomist, International Labor Organization

Bruno Lanvin, Director of Global Indices, INSEAD Business School

Till Leopold, Head of the Inclusive Economies Practice, Centre for the New Economy and Society, World Economic Forum

Fabio Manca, Head of Skills Analysis, Organisation for Economic Co-operation and Development

Carlota Perez, Honorary Professor, UCL Institute for Innovation and Public Purpose²

Laurent Probst, PwC, author of the Lost Workforce

Olga Strietska-Ilina, Senior Skills & Employability Specialist, International Labor Organization

Bruno Tindemans, co-author of the Learning Society

Jan Willem Velthuis, Chief Economist in Europe, PwC

Authors

Randa Bahsoun, Partner, Government and Public Sector, PwC Middle East.

Donia Aqel, Director, Labor Market and Social Policy, PwC Middle East.

Eduardo Rodriguez Montemayor, PwC UK

Jing Teow, Senior Economist, PwC Middle East.

Special thanks to the following colleagues who contributed significantly to our research:

Alain Dagher, Alhassan Omar, Aryan Tah,
Vayana Skabrin, Yumu Chen and Yuval Fertig.

Executive Summary



Since it began in 2019, COVID-19 has resulted in millions of job losses around the world. International Labor Organisation (ILO) analysis suggests that around 8.8% of global working hours, equivalent to 255 million full-time jobs, are estimated to have been lost, with significant social and economic costs.³ Beyond the pandemic however, **the seismic shifts wrought by the twin transitions – toward a greener and digitalized economy – pose a far greater threat to jobs and livelihoods globally.** Estimates suggest that around 30% of jobs are at high risk of automation and this risk could be significantly higher in some countries.⁴

It is not all doom and gloom. While automation poses a clear risks to jobs, the digitalization of many economic activities will also create new jobs and demand for new skills. From the displacement of farming over the course of the industrial revolution, humans have adapted, created new jobs and boosted productivity. In the same manner, artificial intelligence (AI) and robotics will also create new jobs in a greener and digitized economy that will boost productivity and provide service-related employment that is harder to automate.⁴

Similarly, the imperative to move towards decarbonization will lead to job losses in energy and emissions-intensive sectors, but also bring opportunities in new industries ranging from sustainable energy production and storage to efficient resource use and waste management. According to our estimates, applying digital and AI solutions to the green transition could contribute up to US\$5.2 trillion to the global economy by 2030, while reducing worldwide greenhouse gas (GHG) emissions by 4%.

The jobs and opportunities created by the twin transitions will require new skills. People will need to adapt to working alongside digital technologies, including AI. AI provides some promising solutions that have important implications for a greener economy. Solutions such as AI-infused clean distributed energy grids, precision agriculture, environmental monitoring and enforcement, and enhanced weather and disaster prediction and response.⁵ It will also call for core transversal skills, including leadership, management, creativity, communication and adaptability. These skills are likely to command a rising premium in a digitalised economy.

However, our research suggests that many countries are not ready for the twin transitions.

Firstly, skills gaps are a pervasive global problem, one that is only getting worse. PwC's 2020 Global CEO Survey revealed that three quarters of CEOs have difficulty in finding employees with the right skills and see this as a threat to their business. "Underqualification" is one factor, another is that, although educational levels have increased in general, the skills and knowledge acquired by workers through education are often not relevant to the needs of businesses. Such mismatches have important consequences for productivity and innovation.⁶ Skills gaps are also widening: in Europe, skills shortages in certain high value-added sectors coexist with a growing surplus of routine and physical skills as jobs requiring these skills are increasingly automated.

Secondly, the capacity of the private sector to innovate is also unevenly distributed across countries and regions. An economy's capacity to innovate is driven by its ability to produce knowledge, technology and creative outputs, and its capacity to absorb the supply of highly skilled workers. The Middle East and North Africa (MENA) region stands out as a region where jobs are most exposed to the threat of decarbonization, but economies do not yet have the necessary innovative capacity to absorb a highly skilled workforce into the growing sectors of the future, which is partly due to an underdeveloped, yet growing private sector.⁷

Despite the clear economic and social case to do so, progress in upskilling workers remains slow, and is not reaching wide segments of society. Just by closing current skills gaps, the global economy would gain at least US\$6.5 trillion by 2030 via increased productivity – with wider benefits expected as an upskilled workforce continues to innovate further. But only one in three employees globally feel that they have been given the opportunity by their employer to develop the digital and transferable skills they need.⁸

The upskilling puzzle shows that barriers and market failures exist. For example, there is a large social externality from upskilling (economy-wide increases in productivity and innovation) that is not taken into account in individual decisions to upskill, or business decisions to encourage employee upskilling. Businesses also fear losing workers that they have invested in training. These externalities lead to underinvestment in upskilling.

Policymakers have a golden opportunity to unleash the skills economy. This is where citizens feel empowered to upskill themselves, and are enabled to do so via a well-functioning labor market and accessible training systems, and businesses have the tools to invest in innovative sectors of the economy. Both the supply and demand side need to work in tandem to achieve the successful transition to a high skills equilibrium and avoid the skills trap.⁹

Skills (or supply side) policies can help increase the supply of skilled workers. Governments can use skills policies through nudges, incentives and financial support, or legal and regulatory requirements (such as upskilling gap reporting) to increase upskilling. It can also improve the quality of upskilling by reducing information asymmetries and coordinating interventions by facilitating public-private collaboration, enabling employers to signal skills needs, and training providers to respond to those signals. More importantly, a comprehensive welfare policy, protecting people rather than jobs, can give people the right support and incentives to prepare for emerging jobs in new sectors, occupations, and geographies.

Demand-side policies are also needed. Successful upskilling policies will create a supply of newly-upskilled workers to meet anticipated demand in green and digital sectors. However, this is a necessary but insufficient condition to create a market for upskilled workers, as can be seen by the significant challenge of youth unemployment globally.¹⁰

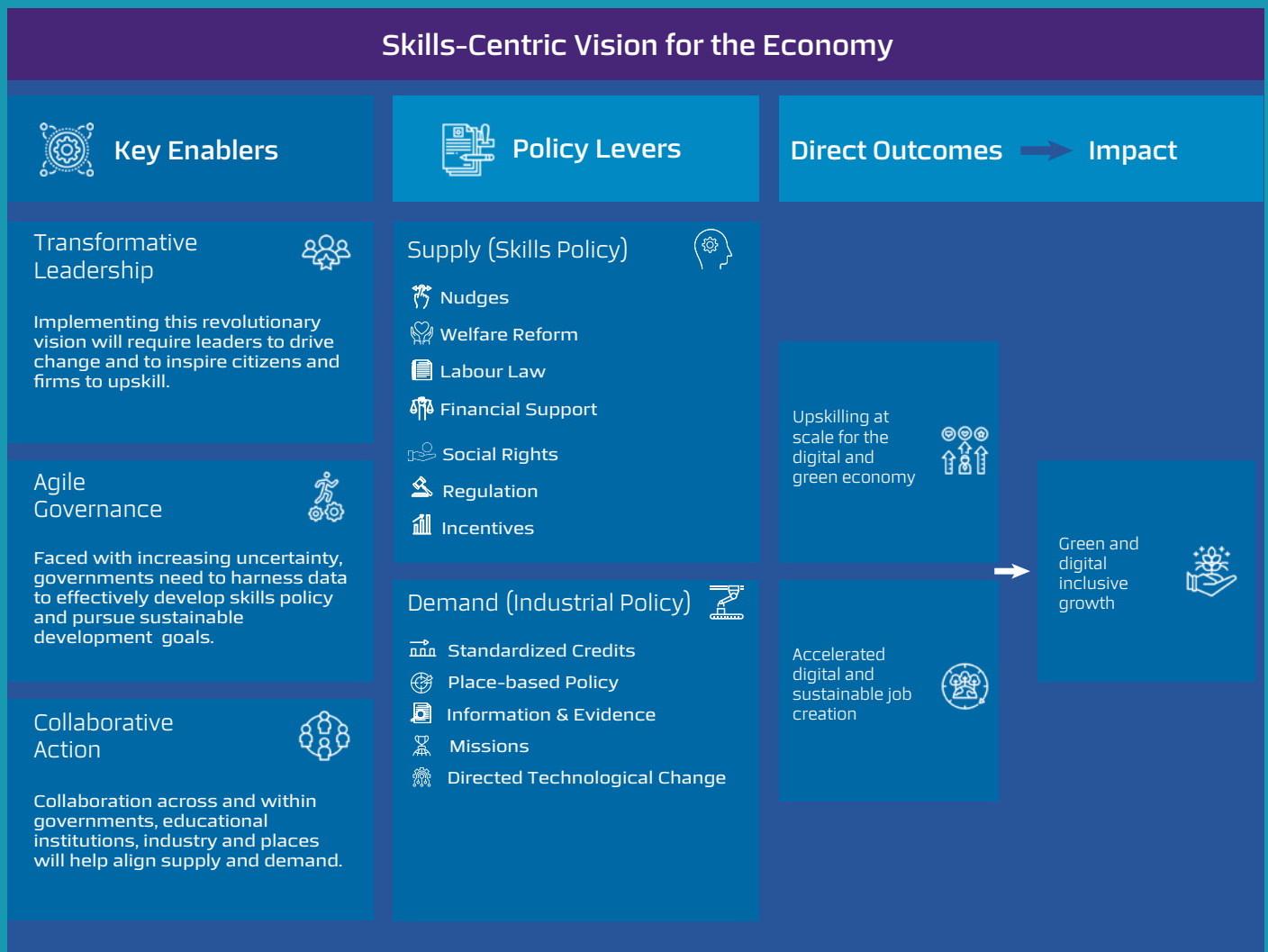
Through industrial policies, governments can support the creation of good jobs to stimulate demand and catalyze the creation of a skills ecosystem. Directed technological change by government can help tilt the playing field in favour of desired societal goals, such as the creation of good quality jobs (living wage, stable employment, upskilling and training opportunities) for skilled workers that are productive and aligned with environmental objectives at the same time. Similarly, modern mission oriented approaches, as advocated by Mariana Mazzucato, Professor in the Economics of Innovation and Public Value at UCL in London, shows that a target oriented approach can be an effective way of "turning challenges into concrete problems to drive innovation".¹¹ The success of the US Moon Shot space program in the 60s shows how targets can concentrate the brightest minds.

The precise policy levers that governments use should be decided on the basis of evidence and experimentation. Nevertheless, it is clear that policies will need to be large in scale and broad in scope.

Beyond policy design and implementation, governments can also play a transformative role in unleashing the skills economy.

To unleash the skills economy, governments around the world need a strategic vision of economic development centered on skills. To put that vision into practice, governments need to embrace three enablers: Transformative Leadership, Agile Governance and Collaborative Action, captured by our framework.

Figure 1: Framework for a Skills-Centric Vision for the Economy



Transformational Leadership

To successfully operationalize this skills-centric vision of the economy, transformational leadership is required. This requires a whole-of-government approach, recognising that the policies to enable upskilling and occupational transitions go well beyond the educational sector, to include housing policy, occupational regulations, tax and social welfare schemes. Leaders also need to articulate skills strategies widely across the economy, inspiring and reassuring citizens about future transformations.

Agile Governance

In a rapidly changing world, agile governance enables policymakers to quickly adapt policy responses to meet the needs of citizens. Governments are increasingly moving away from defining “static” optimal policies that are always assumed to be correct, to “dynamic” resilient policies that leverage the latest insights and innovations to respond to the evolving economic environment. The COVID-19 Pandemic showcased the importance of agility in policymaking. Many governments in the past year have invested in centers that serve as sandboxes to gather data, test ideas and foster innovations. For instance, the United Kingdom’s Financial Conduct Authority has set up a digital-regulatory sandbox to tackle COVID-19-related challenges. This represents a shift in mindset and approach, as governments gradually follow the data and evidence that enable policy innovations.

Collaborative Action

Policies aimed at changing the mindset, behavior and actions of citizens and institutions are more successful if stakeholders, including the triple helix of universities, business and governments, are involved throughout the policy lifecycle. Governments can use their convening power to bring together:

- Employers – to highlight their skills needs and give them a say in the design of courses and qualifications to meet their needs
- Workers – to address their training needs and opportunities for progression
- Skill providers – to design their offerings to meet emerging skills needs, and
- Research and academic institutions – to use the latest research to inform policy design and implementation.

Governments should spearhead strategic collaborations, underpinned by a national skills strategy, as well as coordinate action across stakeholders to minimize fragmentation and strategic misalignment.

Uniting governments behind skill-centric visions for the economy and embracing new ways of governing will be challenging, but nonetheless achievable. We strongly believe that this is a critical element in navigating global megatrends and moving economies forward to a more sustainable and inclusive society, while ensuring good quality jobs for future generations.

Governments need to act now to unleash the skills economy.



Chapter 1

Introduction



Introduction

Global labor markets are undergoing significant tectonic shifts. COVID-19 has not only resulted in millions of job losses globally, it has also accelerated long-term trends such as automation¹², and the growth of the gig economy as we rethink how we live, work and consume.¹³

Gig economy definition

A gig economy is comprised of temporary and flexible jobs as companies hire independent contractors and freelancers instead of full-time employees. The gig economy has grown in recent years through the meteoric rise of Uber, Lyft, Postmates, etc.

While technology and AI are highly disruptive forces, they also create new products and services – and with new economic activities come new jobs. These can be created both directly through novel products and services, but also indirectly through the creation of additional demand and productivity growth.

However, the composition of economic sectors and the types of jobs will surely change. Some sectors were already in long-term decline (e.g. agriculture and manufacturing in developed countries). Early evidence suggests that many of the jobs that have been lost during the pandemic are also those that were already at risk as a result of megatrends, particularly automation, as businesses were ‘forced’ to digitalise processes. For example, a report by the Fabian Society estimated that 61% of UK jobs furloughed in the first half of 2020 were in sectors already at high risk of automation, and are unlikely to be brought back after COVID-19 as consumers shift permanently online. In contrast, the pandemic has also accelerated the growth of those areas that have been expanding for some time such as healthcare services, which had already been responding to ageing populations.¹²

There will be a great price to pay if businesses, governments and society are not well prepared to adapt and capitalize on new opportunities. Opportunities for growth and prosperity are large, and the power of new technologies and innovation are more transformational than ever. Yet, they also threaten the creation of new jobs and the preservation of existing ones, and not all people are ready for this change.

This study seeks to answer how policymakers can turn the threat of the twin green and digital transitions into opportunities.

The Skills Economy

The common denominator of the new sectors emerging from the twin transitions is skills. Countries that are quicker to develop what we have coined their “**skills economy**”, one where people and technology complement each other to innovate, will have the competitive edge and, as we argue in this paper, a stronger chance of achieving inclusive and sustainable development.

In a skills economy, learning takes place over the course of a lifetime and provides pathways to new, better jobs. Singapore, a country that focuses its successful national development strategy on managing talent, has deployed the precepts behind the skills economy to innovate consistently and become one of the most competitive and prosperous countries in the world.

Upskilling efforts are not reaching wide segments of society despite a clear economic and social rationale to do so. According to the World Economic Forum’s Future of Jobs Report 2020, companies estimate that, by 2024, around 40% of workers will require reskilling of up to six months. Governments, businesses and societies in general are increasingly aware that the twin transitions are happening. Yet, adaptation is not occurring at the pace needed.¹⁴ This suggests that there are hurdles in how people behave and how markets operate that slow down progress.

Governments can play a crucial role in overcoming these challenges by helping improve and coordinate the supply and demand for skills, and by unleashing the skills economy.

Report Structure

- **The Risks and Opportunities of the Twin Transitions**
Presents megatrends as double-edged swords by revisiting the threats they bring to jobs and societies, but also identifying the potential opportunities for growth and jobs in the markets of tomorrow, including in the green economy.
- **Country Readiness for Smart Green Growth**
Provides an assessment of how prepared countries are for the twin transitions. Country readiness is a function of having the right skills and also the right institutional and market environments to innovate in new economic sectors.
- **Solving the Upskilling Puzzle**
Outlines the role governments can play to solve the upskilling puzzle: by helping overcome market failures in labor markets and influencing the direction of innovation towards the markets of the future.
- **How Governments Can Unleash the Skills Economy**
Offers a framework for government action underpinned by key transformational enablers.

Chapter 2

The Risk and Opportunities of the Twin Transitions



The Risk and Opportunities of the Twin Transitions

The twin transitions pose both threats and opportunities to jobs. In this chapter, we evaluate:

1. The future job threat level posed by the automation of tasks and the decarbonization of industries over the next few decades, and
2. The current level of opportunities in the digital and green economy.

Our analysis reveals that countries are on starkly different economic trajectories.

The Impact of Technology on Jobs

The rise of machines is considered one of the “grand challenges of our times”⁴⁵, together with rising inequalities⁴⁶ and the polarization of jobs (between increasingly high-skilled and low-skilled jobs), the environment, and global asymmetries in demographics, with some countries experiencing rapidly ageing populations while others are grappling with youthful populations.⁴⁷

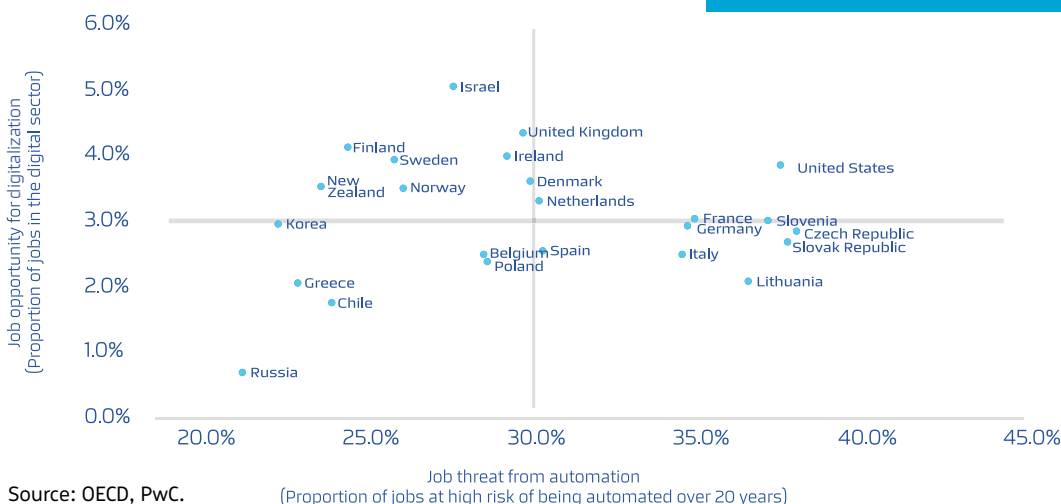
While automation poses clear and present risks to certain jobs, the broader emergence of digitization could offset these job losses in the long run, as shown in PwC research and the World Economic Forum’s Future of Jobs report.^{48,49} Technology complements the work of many people, thus “augmenting” their performance.

“It is not convincing that automation and green transition will be negative for employment. The transition is difficult as people will lose jobs, but new ones will be created.”

Olga Strietska-Ilina, International Labor Organization

However, the risks and opportunities are unequally distributed across countries.

Figure 2.1 - Digital Economy: Job Threat and Opportunity Level¹³



Source: OECD, PwC.

(Proportion of jobs at high risk of being automated over 20 years)

Figure 2.1 plots the exposure of countries to the job threat of automation, against the current size of job opportunities from digitalisation. In some countries, change is more critical than in others depending on the mix of threats and opportunities they are facing:

- In a few countries, particularly in the Nordic region, high levels of digitalisation present large potential for job creation while the risks of job losses due to automation are likely to be minimal. These countries are likely to face the transition with lower disruption, with lower disparities between winners and losers of the technological revolution. This happens when workers tend to be employed in skilled occupations that are less routine and where technology “augments” productivity rather than replacing work. The common denominator in Nordic countries is that their government-led skills strategies have promoted changes in work organisation as well as industrial and/or innovation policies that stimulate employer demand and move the country up the value chain.
- By contrast, in countries such as Italy, Lithuania, Slovakia, Spain and Austria (those in the bottom right quadrant), the digitalisation of the economy is expected to have a greater negative rather than positive impact on jobs. Some of these countries are also characterised by rigid labor markets, making adaptation more difficult. Policy support and change is more urgently needed.
- In countries such as the UK, Netherlands and Denmark, there is a high threat of automation (affecting at least 30% of jobs), but these countries are also highly digitalised, and therefore more opportunities are likely to be present. These opportunities could include jobs in emerging professional clusters, such as working with data storage technologies, artificial intelligence, and software development. These countries also benefit from relatively flexible labor market policies, which, when combined with income support to undergo training, such as Denmark’s “Flexicurity” model, can help workers capitalise on these opportunities and transition to new jobs.

Without the right strategies, digitalization will widen inequalities

Transformations in the wider economy can be significant, particularly in emerging markets (see **Box 2.1**). The global drive towards greater efficiency and competitive pressures on cost can represent long-term threats to secure and good quality employment. Even though the overall impact of technology on job creation is very likely to be positive, some people will lose out amid a polarization of jobs and wages.²⁰

Countries need holistic developmental strategies that promote new sectors of economic activity and leverage the skills and talents of their populations. In the absence of urgent policy interventions, highly unequal labor markets could result, as well as sharp rises in unemployment. This will have significant welfare implications for individuals and societies.

Box 2.1 – Automation and Emerging Markets²¹

Lessons learned from developed economies show that rising automation and routinization have triggered labor market dislocations at a large scale.²² This effect could be more pronounced for developing economies considering the pace at which production is being automated. Moreover, given that machines are increasingly cheaper to buy, developed economies may opt to automate rather than relocate jobs to emerging or developing economies. This would further amplify job displacement in emerging or developing economies and erode middle-skilled employment. This in turn would result in premature deindustrialization – a process in which emerging countries start to lose their manufacturing jobs without getting rich first.²²

Although lower-income countries can still rely on large pools of “cheap” labor to sustain their economies (mainly in Africa), in emerging (middle-income) countries that have benefited from the outsourcing of routine tasks on the value chain (e.g. manufacturing), the impact of automation is expected to be high. Some of these countries can fall into, or struggle to get out of, the middle income trap: too expensive to be competitive, but not sufficiently upskilled to benefit from tech opportunities. Emerging economies face the challenge of converting their cheaper labor advantage into a skills advantage that allows them to compete



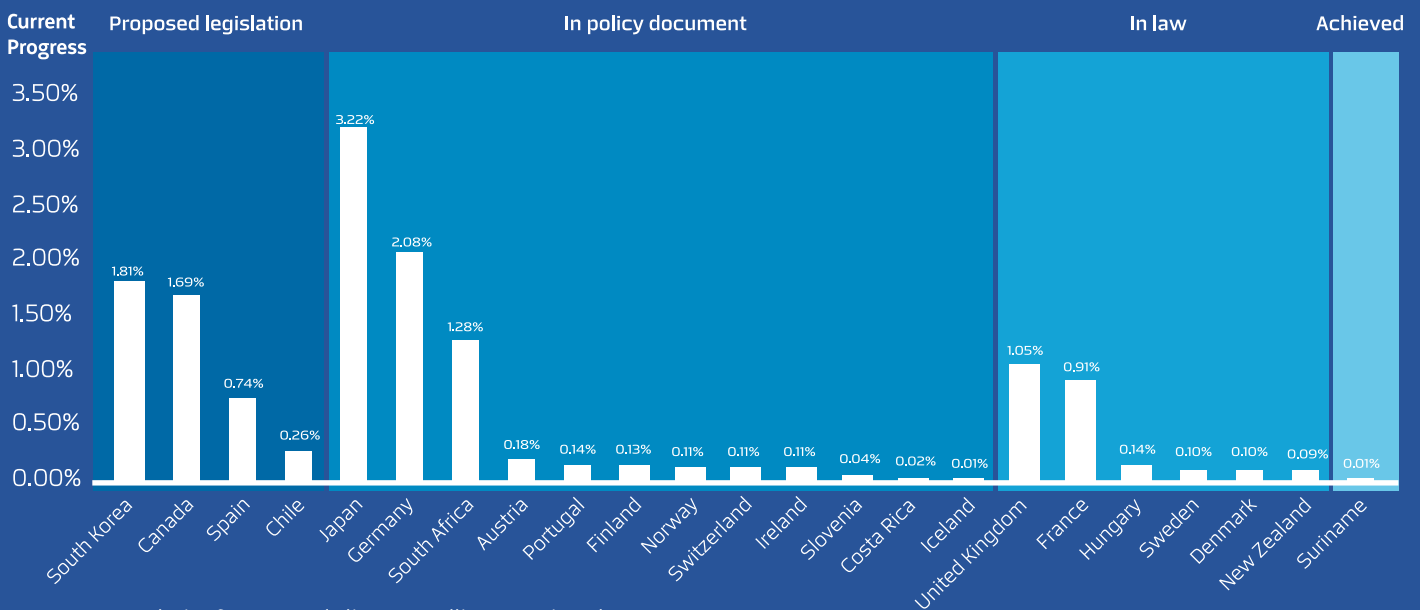
The Impact of Decarbonization and ‘Greening’ on Jobs

The risks that climate change pose to the planet and our wellbeing are incontrovertible. The negative ramifications are wide and will affect people and economies in different ways, including magnifying inequalities between rich and poor countries. ILO research finds that worsening physical working conditions as part of the direct consequences of global warming can lead to a loss of labor productivity of 2.2 percent in 2030.

These high temperatures result in a loss of productivity of 2.2 per cent in 2030 compared with a scenario with no climate change. This resulting impact is larger in poorer countries, due to a higher proportion of outdoor workers performing physical work.²²

Since the Paris agreement, there is a mounting pressure for decarbonization of economies and many countries are committing to net zero emissions targets (Figure 2.2). Still others are likely to commit to targets in the future.

Figure 2.2 - Countries are Committing to Net Zero Emissions Targets



Source: PwC analysis of Energy and Climate Intelligence Unit and IEA

The importance of transitioning to a more sustainable low-carbon economy has continued to gain momentum, rising up the agenda of policymakers, businesses and investors. The green economy is now widely seen as integral to global and national economic recovery post COVID-19. For instance, the European Union has been a global leader on this issue for decades, and it has stuck to its ambitions even through the COVID-19 crisis. Among other initiatives, the EU has launched what European Commission Executive Vice President Frans Timmermans has dubbed “the world’s greenest stimulus plan”. With the European Green Deal, the EU has also increased its 2030 emissions-reduction target to 55%, and committed to achieving carbon neutrality by 2050.²⁴

These commitments are undeniably positive, but they will impact jobs, creating both threats and opportunities for many workers.²⁸

The green revolution will create new opportunities and initiatives both in the private and public sector: from sustainable energy production and storage, through to efficient resource use and waste management. Many countries are setting up big plans for green and net zero ambitions. The 10-point plan proposed by the UK Government in November 2020 will mobilise £12 billion of government investment, and potentially three times as much from the private sector. The launch of the Green Jobs Taskforce seeks to support the creation of 2 million skilled jobs to “build back greener” and reach net zero emissions by 2050.²²

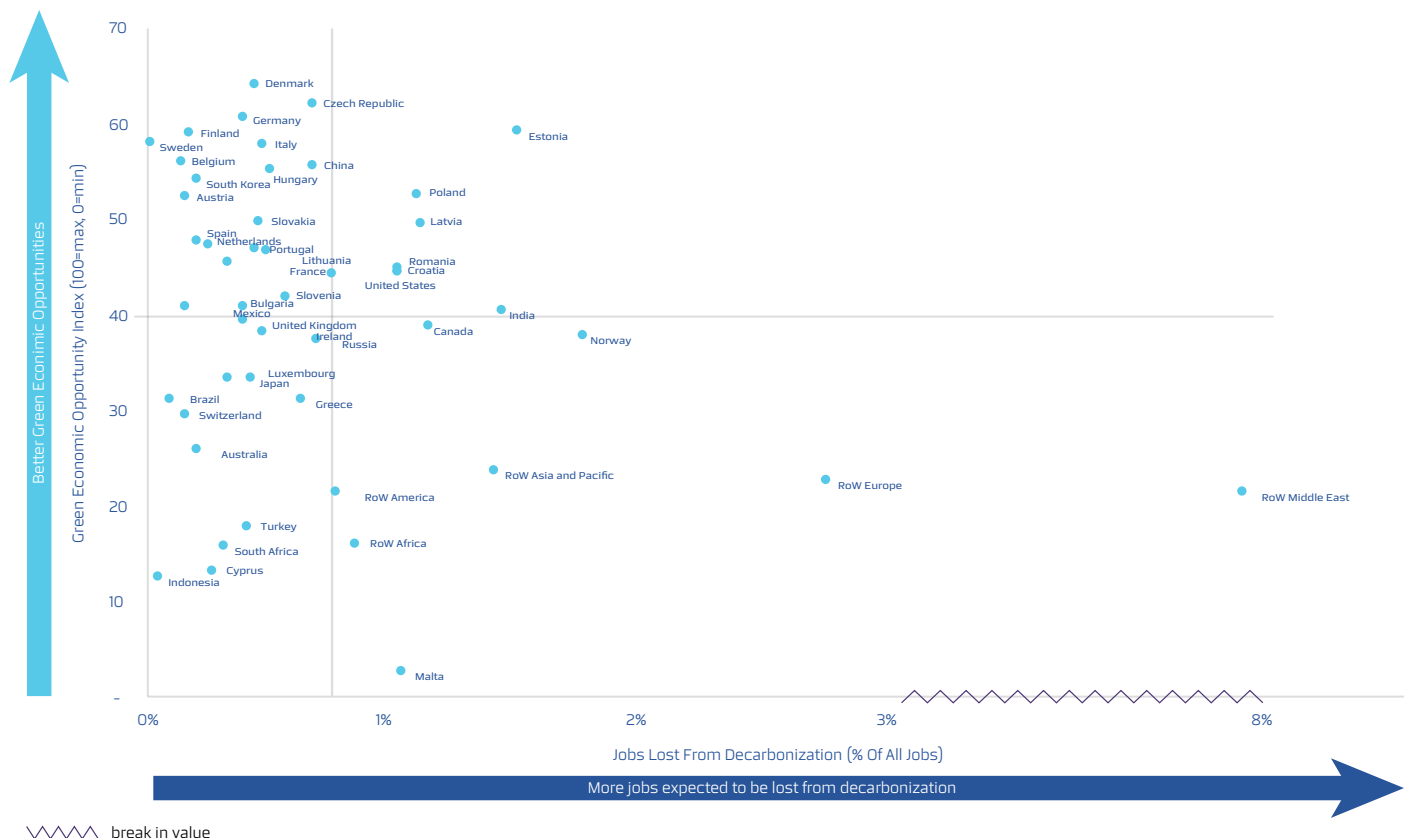
However, as with digitalization, decarbonization will bring both job losses as well as opportunities.

The gains from the digital transition can also help accelerate the green transition

Figure 2.3 maps the threat to jobs from decarbonization against green economy opportunities. As with technology, there are also “winners” from the green transition – countries that have less to lose in terms of direct job threats, and are also better prepared in terms of job opportunities (top left quadrant).

Countries that are more likely to benefit from green opportunities, such as Sweden, Finland and Denmark are also leading the way in technology adoption and digital transformation. This confirms that there are synergies between the digital transition and the green transition: indeed digital technologies such as artificial intelligence, 5G, internet of things (IOT), cloud and edge computing also have the capacity to accelerate and maximize the effects of environmental policies.

Figure 2.3 - Green Economy: Job Threat and Opportunity Level²⁵



Source: PwC analysis of Exiobase and Green Growth Index

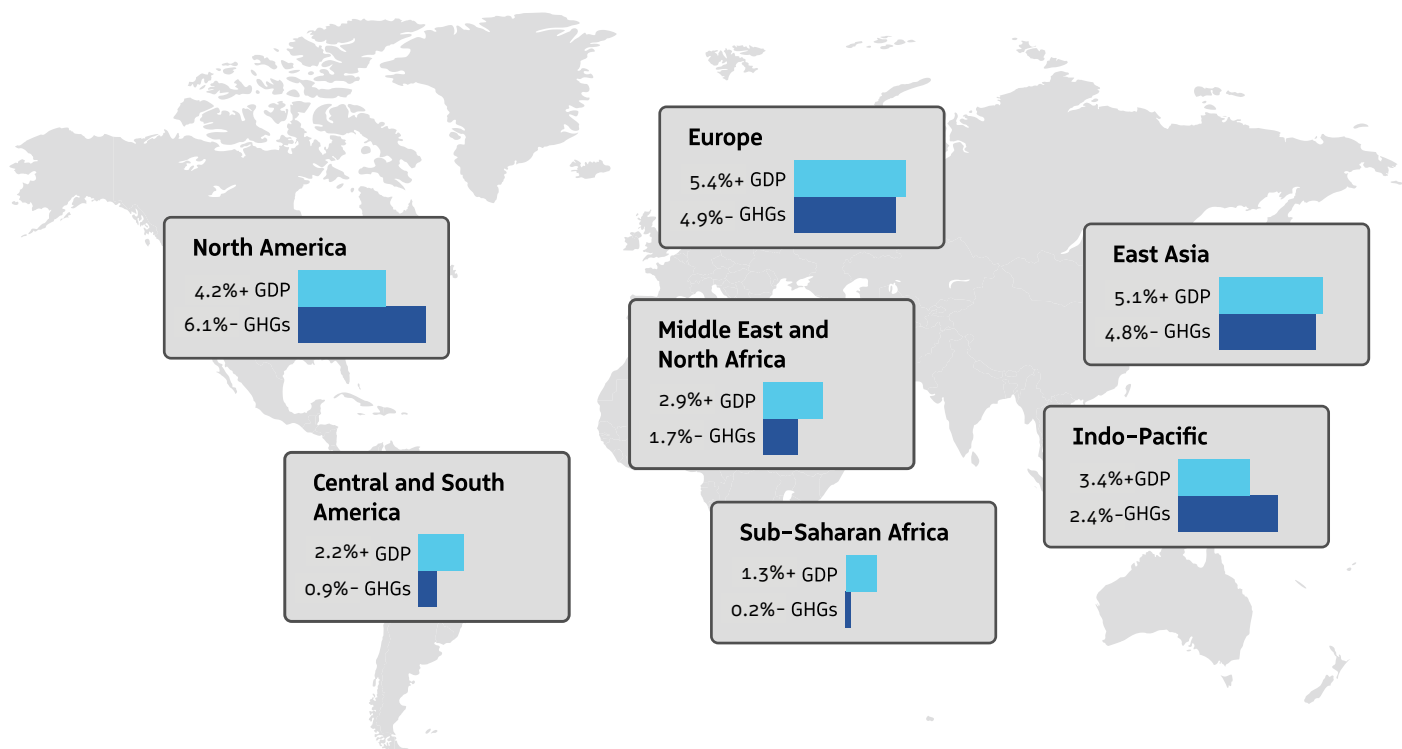
Efforts to decarbonize will mean losing some jobs in energy- and emissions-intensive sectors. Figure 2.3 reveals that the region with the greatest threat to jobs from decarbonization, and where the most urgent action is required, is the Middle East (“RoW Middle East”), which also has below average green job opportunities. This is also the case for some Latin American economies and large parts of Africa.

Our own research shows that AI in particular can be harnessed in a wide range of economic sectors and situations to contribute to managing environmental impacts and climate change. These include AI-infused clean distributed energy grids, precision agriculture, sustainable supply chains, environmental monitoring and enforcement, and enhanced weather and disaster prediction and response.

Beyond the impact on jobs, shifts to the green economy are likely to have other indirect consequences on labor markets. These effects are also likely to be unevenly distributed. For example, prevailing differences in education and fields of study between men and women that are relevant for participating in the green economy mean that women are more likely to be negatively affected by the twin transitions.²⁶

According to estimates of such research, using AI for environmental applications could contribute up to US\$5.2 trillion to the global economy by 2030 (Figure 2.4), a 4.4% increase relative to business as usual, while reducing worldwide greenhouse gas (GHG) emissions by 4% between 2020 and 2030,⁵ an amount of to 2.4 Gt CO₂e – equivalent to the 2030 annual emissions of Australia, Canada and Japan combined.

Figure 2.4 - AI for the Environment Headline Results for Global GDP and GHGs by 2030²⁷



Source: PwC and Microsoft, How AI can enable a Sustainable Future, 2020

At the same time as productivity improvements, AI could create 38.2 million net new jobs across the global economy by 2030, offering more skilled occupations as part of this transition.⁵

This suggests that during the twin transitions, digital and green goals can complement and reinforce one another.

Skills for a Digital and Green Economy

Potential job transitions to new occupations or sectors must be anticipated and encouraged if job loss threats are to become opportunities. This requires an understanding of the new skill sets needed to facilitate these transitions.

Research of online job vacancies by the World Economic Forum shows that the professional clusters with the highest job growth rates are Data and AI, Green Economy, and Engineering and Cloud Computing, with annual growth rates of 41%, 35% and 34%, respectively (Table 2.1).

Table 2.1 - Emergence of Cluster of Professions of the Future, 2020-2022²⁸

Professional Cluster	Job Opportunities in 2020	Job Opportunities in 2022	Annual Growth Rate	Top 10 Skills
Data and AI	0.8%	1.2%	41%	Data Science Data Storage Technologies Development Tools Artificial Intelligence Software Development Life Cycle (SDLC) Management Consulting Web Development Digital Literacy Scientific Computing Computer Networking
Green Economy	0.1%	0.1%	35%	Digital Marketing Wind Turbines Landfill Gas Collection Social Media Equipment Inventory Solar Installation Health and Safety Standards Microsoft Power BI Electrical Diagrams / Schematics Email Marketing
Engineering and Cloud Computing	0.6%	0.9%	34%	Development Tools Web Development Data Storage Technologies Software Development Life Cycle (SDLC) Computer Networking Human Computer Interaction Technical Support Digital Literacy Business Management Employee Learning & Development

Professional clusters that follow in the ranking of highest growth rates:

People and Culture
Product Development
Sales, Marketing and Content

Care Economy²⁹

Source: World Economic Forum

The jobs enabled by the twin transitions require a mix of technical, digital and transversal skills. The H-shaped model of skill competencies (**Figure 2.5**) shows how deep technical expertise can be used to provide deep digital expertise and competencies through transversal skills that reflect an individual's ability to connect technical expertise into digital competencies. The H-shaped model illustrates how different jobs will require a mix of different skills along a spectrum.³⁰

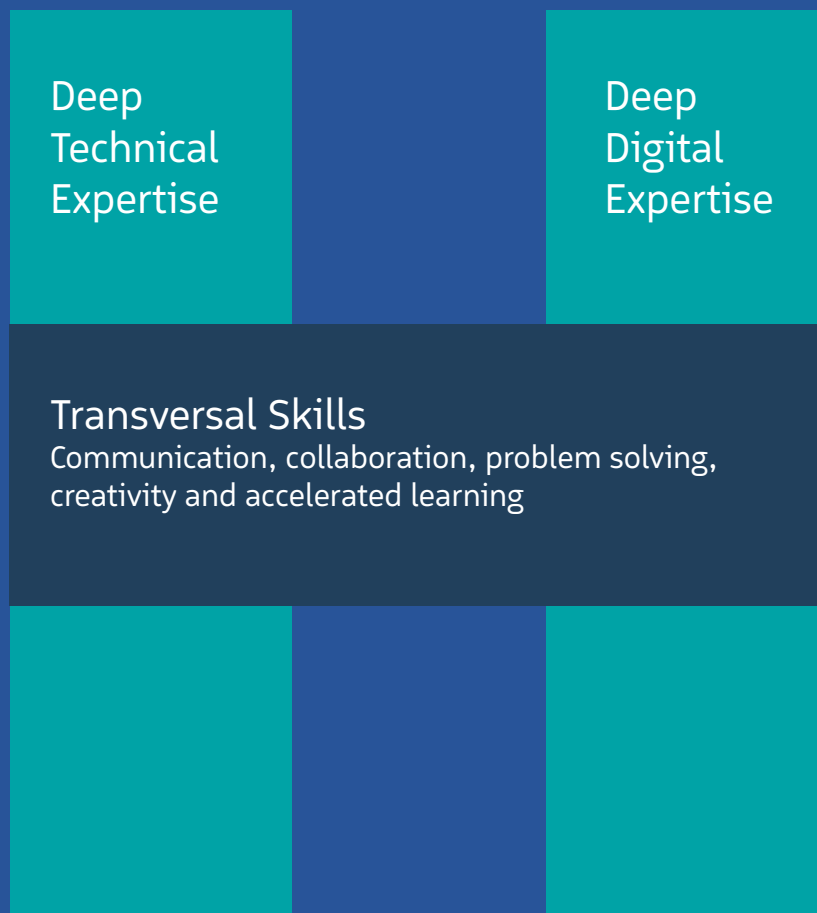
Most jobs already require a mix of these skills, but some will require greater emphasis on technical expertise and/or digital expertise. To illustrate this point, AI engineers will not only require problem solving skills (and understanding how AI can be applied to solve them), but also a deep understanding of specialist skills (e.g. machine learning).

However, most people will need the skills to work alongside AI (the human-machine symbiosis), and as many as 120 million workers in the world's 12 largest economies would need to be retrained or reskilled as a result of AI developments.

Since a fair share of the green transition will be enabled by the power of data and AI applications, such AI skills will also be important for the green economy.

More importantly, the core transversal skills for leadership, management, creativity, communication and adaptability will continue to grow in relevance (as reflected in the ILO's Skills for Green Jobs paper). For instance, strategic and leadership skills will enable policymakers and business executives to set the right incentives and create conditions conducive to cleaner production or to seizing the opportunities of low-carbon technologies.²³

Figure 2.5 - H-shaped Model of Skill Competencies³⁰



Source: PwC analysis



Chapter 3

Country Readiness for Smart Green Growth

Country Readiness for Smart Green Growth

The readiness of countries to achieve the twin transitions is a supply and demand question. It is determined by having the right skills for the economy, as well as the extent to which jobs and opportunities are created in the digital and green economies.

Skills Readiness

Skills gaps and mismatches are pervasive. Evidence suggests that many countries are not ready for the twin transitions.

PwC's 2020 Global CEO Survey revealed that three quarters of all respondents believe that the difficulty in finding the right skills is a threat to their businesses. Historical evidence confirms this.⁴⁰ Surveys of EU companies over the last decade have consistently shown that four in ten businesses report difficulties in finding staff with the right skills.³¹ Under-qualification is still creating large skills gaps worldwide.

Furthermore, although educational levels have increased in general, businesses struggle to find talent with relevant skills for their businesses. As new technologies continue to rise, this divide between education and business-demanded skills can potentially grow wider. Already we see this, as many countries experience problems of over-qualification (e.g. in Brazil or Mexico in **Figure 3.1**), under-qualification (e.g. many western European economies), or both (e.g. South Africa).³²

Field-of-study mismatches are also hampering economies today. In OECD countries, one-quarter of workers report a mismatch between the skills they have and those required for their job. These challenges suggest the existence of important market failures, with important consequences for productivity and innovation.

Furthermore, although educational levels have increased in

Figure 3.1 - Skills Mismatches Across OECD and 7 Non-OECD Countries^{33,34}



Source: OECD (2016) data 'Skills for Jobs'

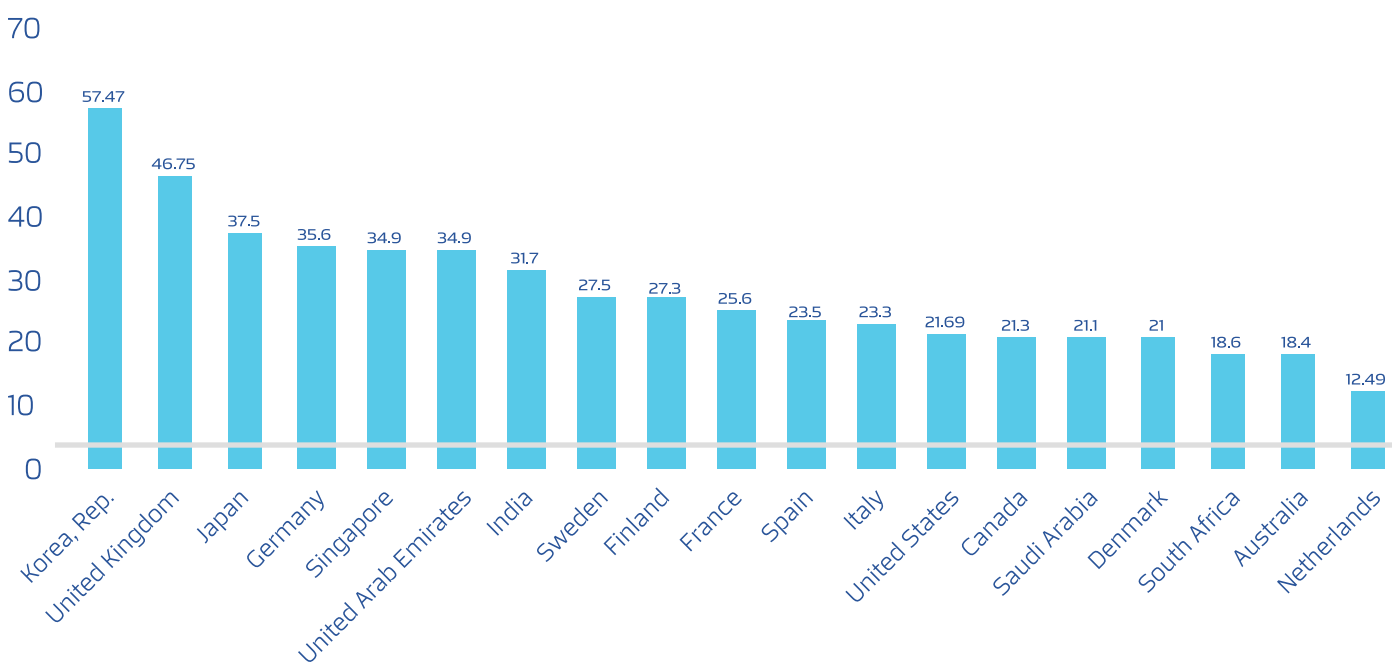
Skills Gaps are Widening

Skills requirements of all jobs are constantly evolving; new sectors in the digital and green economy require new competences and knowledge. Even workers who do not necessarily think they need to be upskilled need the basic competencies for adaptation, in case change arrives in the future.

There is evidence that skills gaps are widening. In the EU, for instance, skills shortages in certain high value-added sectors coexist with a growing surplus of routine and physical skills (as jobs requiring these skills are increasingly automated). The EU Skills Report forecasts up to 2030 points to the fact that basic manufacturing will decline, while high-value added service sectors, in which 80% of new jobs will be created, will continue to grow. This will require either massive replacement or upskilling of the existing workforce: by 2025, about 48% of all job opportunities in Europe will involve more sophisticated tasks and use of technology, and will need to be filled by individuals with post secondary education qualifications.⁵⁰

The twin transitions will also require people with more technical expertise, particularly in STEM fields. As highlighted in the ILO report “Skills for a Greener future”, a lack of STEM graduates can act as a barrier to sustainable transitions. Yet, this is one of the areas with larger skills shortages: the percentage of graduates in science and engineering continues to be low (**Figure 3.2**). As shown below, most countries are struggling to churn out even half (50%) of all graduates in Science, Engineering and Construction – with the exception of a few countries (South Korea is a notable example).³⁵

Figure 3.2 - Graduates in Science, Engineering and Construction as % of all Post Secondary Graduates³⁵



Source: Global Innovation Index data, 2020 or most recent available year (2017 cut-off)

Transitioning to a low-carbon and digitalized economy is likely to require broader industry shifts and, therefore, specific skills related to the new industries. For example, a move to a low-carbon economy requires changes in technologies of production as well as resources (including labor) shifting from polluting to non-polluting industries. The skills needed in the former will likely differ from those in the latter. Skills gaps are already recognized as a major bottleneck in a number of sectors, such as renewable energy, energy and resource efficiency, renovation of buildings, construction, environmental services and manufacturing.

Growing skills gaps, though, are not limited to sectors in the digital economy or technology intensive sectors. PwC UK research finds that many of the occupations facing shortages are not expected to be highly automatable (e.g. many professions in healthcare continue to be labor-intensive) while demand is increasing.

Reskilling is not an easy endeavor: with rapid technological change, the time it takes to close a skills gap through training may have increased by more than ten times in just four years, according to IBM global research. Therefore, success in closing widening skills gaps requires an institutional and business environment that supports individual upskilling efforts.

Readiness for the Future

The **skills readiness** of countries is a function of the skills they currently have (and any skills gaps they face) and how prepared they are for future skills development.

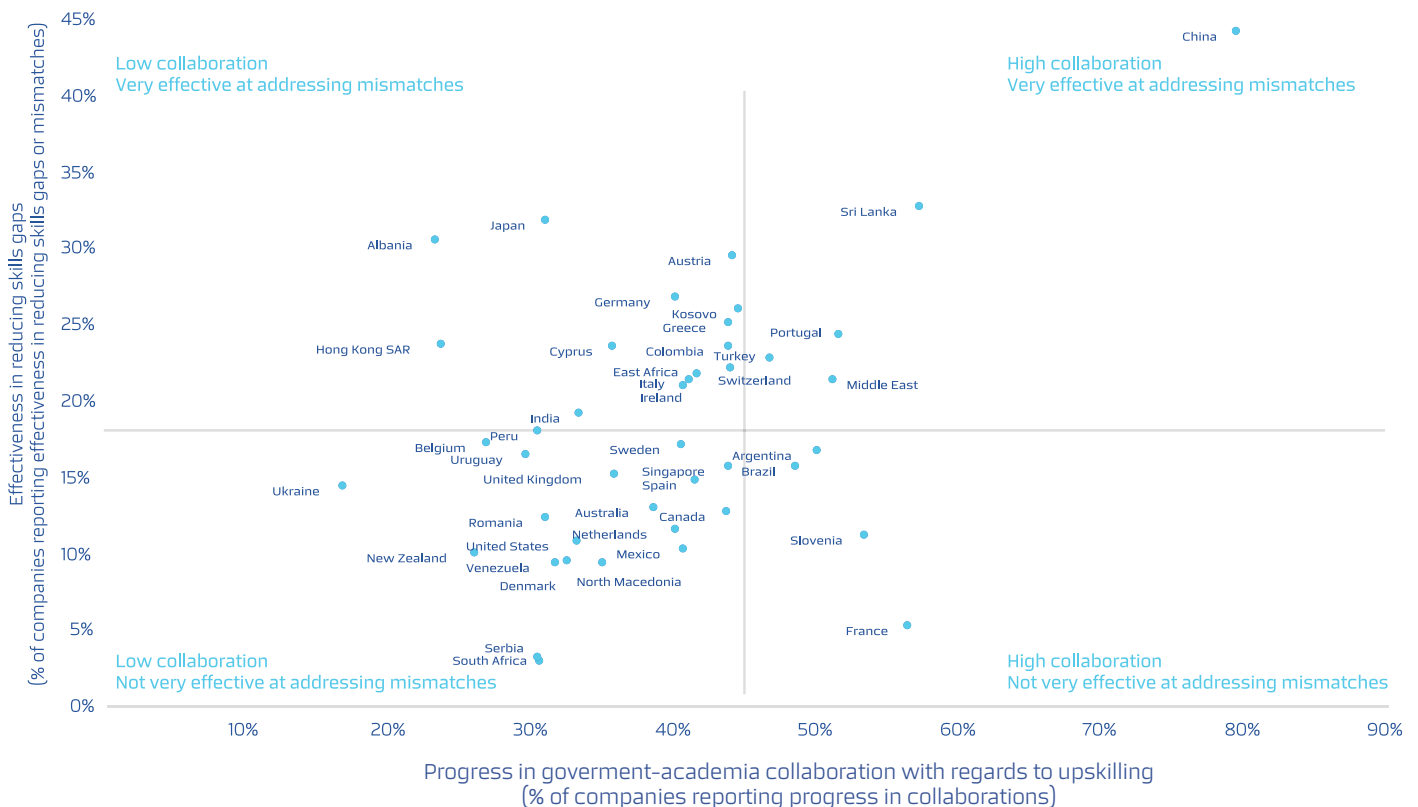
According to PwC’s 2020 Global CEO survey, in many countries, companies are reporting little progress in reducing skills gaps. Yet, some countries seem to be in a better position to solve such skills gaps, even if their progress has been slow to date. There are countries where companies report stronger collaboration with government and academia (**Figure 3.3**), which is one of the crucial moves to align the supply and demand of skills (how to strengthen collaboration of governments with businesses and the education sector is further analysed in Chapters 4 and 5).

Countries in which governments collaborate and coordinate with the private sector on matters of upskilling have also seen greater reductions in skills mismatches. Companies in Spain, a country which is currently facing deep skills mismatches, appear to be making good progress. South Africa stands out as falling behind, reporting very low collaboration and fewer than 3% of companies making progress in reducing skills gaps.

In general, the right institutional and policy set up is important because, with the twin transitions (green and digital), more workers than in the past will need to shift industries or change occupations to take on the new jobs that emerge. This can already be seen in the past few decades with cloud computing, blockchain technology and AI foreshadowing the transition the majority of workers will face in the future. The success of these transitions will certainly depend on how closely the skills of old jobs that are being displaced are related to the skills of new jobs, and if limited, the ability to reskill. More importantly, opportunities for workers to change occupations depend on several country characteristics beyond skills, including institutional barriers, such as occupational licensing and the flexibility of the labor market.

As we will show in Chapter 5, the coordination of policies (across several policy areas) that give incentives to people to retrain and move to more productive jobs is essential for the twin transitions. By combining access to training institutions and income support from the government, such as in the Nordic region, workers are encouraged to search constantly for new skills while also getting involved in the ongoing redefinition of job roles.

Figure 3.3 - Relationship Between Companies Reducing Skills Gaps and Collaboration with Government-Academia³⁶



Source: PwC’s 23rd Global CEO Survey

Innovation Readiness

Our focus thus far has been on the supply-side and the need to upskill workers, but a holistic approach to skills also requires paying attention to the demand-side. This seems an obvious proposition, but there are many examples of countries where national investments in education are not yielding the expected outcomes. Skills gaps will remain large wherever there are mismatches between fields of study and what companies are looking for, and often people with degrees cannot find jobs.

A possible cause of this is the lack of innovation readiness, particularly in the private sector. To navigate the twin transitions effectively, countries need to be ready to innovate. This usually demands a dynamic private sector, and the right level of government support to pursue the most rewarding innovation opportunities.

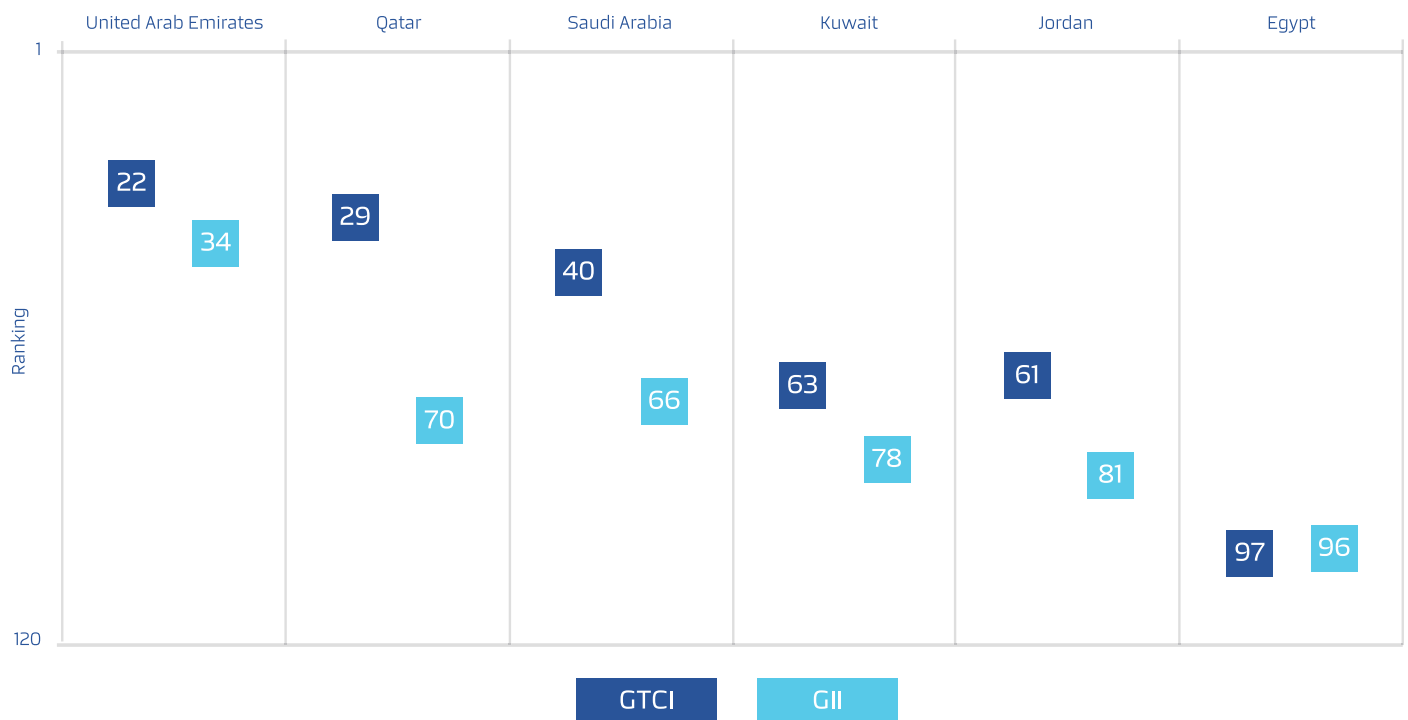
“Without development in the sense of wealth creation supported by innovation, education alone will not do the job. The two form a feedback loop and you cannot succeed with one without the other.”

Carlota Perez, University College London

Only a few countries, have managed to effectively align skills and innovation policies. One way of looking at this is to consider the gap between how countries are performing on skills and their innovative capacity. The MENA region stands out as a region where skills performance, as measured by the Global Talent Competitiveness Index (GTCI) stands in stark contrast to innovative capabilities, as measured by the Global Innovation Index (GII). Skills performance is strong in countries such as the UAE and Qatar, but most countries in the region lag behind in terms of innovation (**Figure 3.4**).

Despite the large heterogeneity in the structure and performance of their economies, a common denominator across MENA countries is a high rate of youth unemployment. This is partly driven by inadequate skills (deficient supply), which is exacerbated by the imbalanced share of economic activity between a dominant public sector (a large oil exports sector in the case of GCC countries) and an underdeveloped private sector (deficient demand).³⁷ Competitive dynamics are also weaker than in developed countries and highly-paid private sector jobs remain scarce, which is likely to encourage jobseekers to continue pursuing public sector employment.

Figure 3.4 - Performance of Selected MENA Countries in Global Innovation Index (GII) and Global Talent Competitiveness Index (GTCI)³⁸



Source: PwC’s analysis using data from the Global Innovation Index (GII 2020); Global Talent Competitiveness Index (GTCI 2020)

Chapter 4

Solving the Upskilling Puzzle



Solving the Upskilling Puzzle

In the above chapters, we argue that global megatrends such as automation and decarbonization are exacerbating pre-existing skills gaps. Large-scale continuous upskilling is therefore necessary if workers are to remain relevant in the new world of work. In this chapter, we first argue that large-scale reskilling and upskilling is in the collective interest of individuals, businesses and governments. We then outline the roles that governments can play in order to optimize the level of upskilling in a way that maximizes its impact.

“It’s a new world that needs new skills. Not everyone has to learn to code, but many people need to understand and manage artificial intelligence, data analytics, autonomous vehicles and other technologies. We can’t yet predict – those emerging now and those that will be created in the future. People throughout every enterprise also need stronger leadership skills: the ability to inspire and empower others to take on the challenge of continuous learning, and to make good decisions about the use and implementation of technology.”

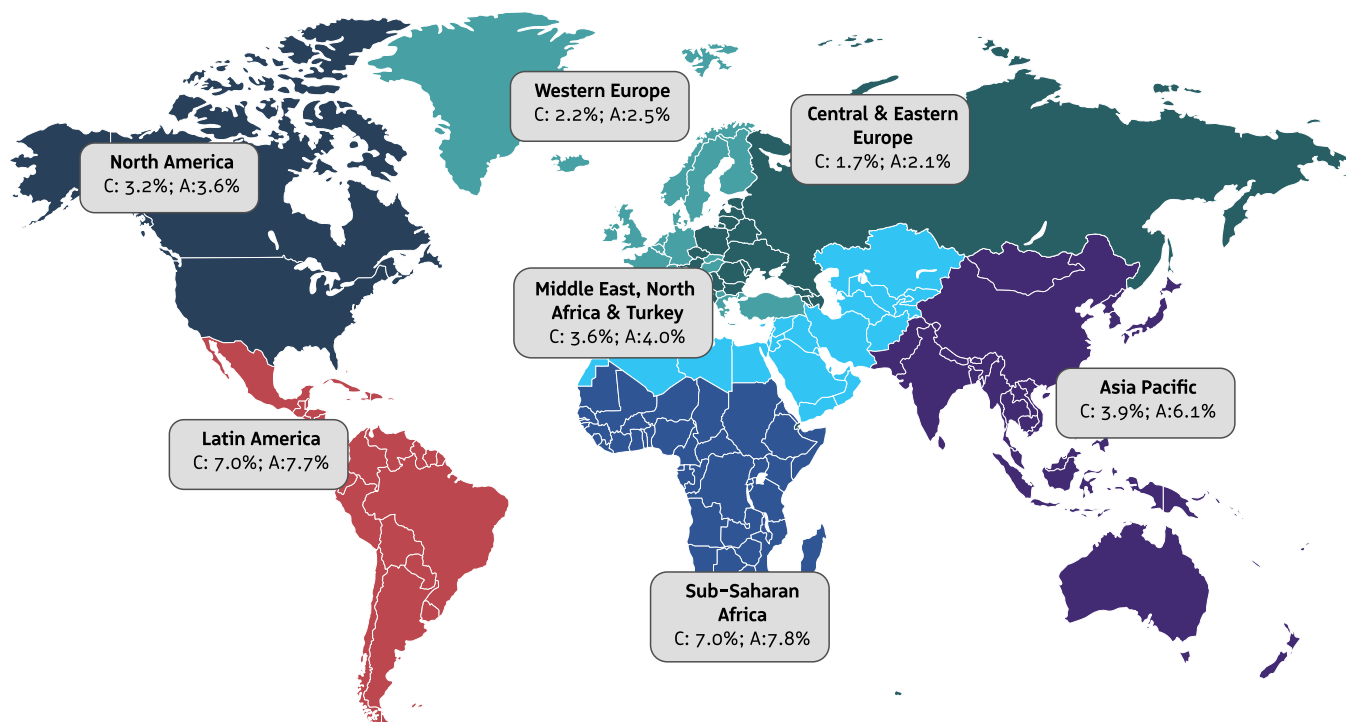
Bob Moritz, Chairman of the PwC Network in Preparing everyone, everywhere, for the digital world

The Economic and Social Case for Upskilling

The economic case for upskilling is significant. A recent study by PwC and the World Economic Forum suggests that closing skills gaps through large-scale upskilling by 2030 could increase global GDP by \$6.5 trillion (**Figure 4.1**).³⁹

In this analysis, upskilling serves to upgrade the level of human capital in the economy, which makes processes more productive and encourages innovation, and as a result, goods and services can be produced at a lower cost and higher quality, increasing GDP.⁴⁰ The mechanisms through which upskilling benefits the economy are wide and involve individuals, businesses and the broader society.

Figure 4.1 - The Boost to GDP from Large-scale Upskilling (as a % of GDP)³⁹



Source: WEF & PwC (2021)

C: Core Scenario: Assumes the skills gaps are closed by 2030. This would add \$5 trillion to Global GDP

A: Accelerated Scenario: Assumes skills gaps are closed by 2028. This would add \$6.5 trillion to Global GDP by 2030

Upskilling Can Also Deliver Broader Social Benefits

Alongside the economic imperative to upskill workers, there is a complementary social case for upskilling, which draws on a more humanistic view of upskilling as opposed to the purely economic one.⁴⁴ The humanistic view emphasizes the ability of education to achieve social welfare, based on evidence that upskilling can improve levels of individual wellbeing⁴² (life satisfaction, confidence, mental health, life expectancy, cognitive functioning)⁴³ and is associated with reduced crime rates and higher levels of participation in voluntary and community activities.⁴⁴ **Table 4.1** summarizes these varied benefits.

Table 4.1 - The Economic and Non-Economic Benefits of Upskilling

Economic Benefits	Non-Economic Benefits
Individuals <ul style="list-style-type: none"> Higher wages Increased employability A greater economic ambition 	Individuals <ul style="list-style-type: none"> Improved mental and physical health Increased life expectancy Enhanced critical thinking and reduced cognitive decline Increased job satisfaction
Businesses <ul style="list-style-type: none"> Increased productivity Improved talent acquisition and retention Greater innovation and digital transformation⁵¹ More resilient workforce 	Businesses <ul style="list-style-type: none"> Greater employee engagement Stronger corporate culture Higher optimism and motivation More collaboration
Society <ul style="list-style-type: none"> Higher employment Greater economic output/income International competitiveness Increased tax revenue 	Society <ul style="list-style-type: none"> Reduced crime and reoffending rates Reduced inequality and poverty Increased political participation Stronger communities

Source: PwC analysis

The upskilling agenda is more important than ever. The COVID-19 pandemic has strengthened the economic case for upskilling in several ways. Firstly, the pandemic has accelerated pre-existing megatrends such as the impact of automation and augmentation on jobs, which increases the cost of not upskilling.¹⁸ Secondly, there is an immediate need to retrain and upskill people that have lost their jobs due to the pandemic.¹⁹ Moreover, evidence suggests that adult education can be most effective and beneficial when it coincides with major life transitions, especially if upskilling is seen as playing a “pivotal role in helping people achieve their ambitions and aspirations.”⁴⁵

The Upskilling Puzzle

Although the costs of upskilling varies depending on the scale and nature of each program, and the benefits of informal upskilling can be hard to quantify, it is estimated that the benefits of upskilling often exceed the costs many times over.⁴⁶ Our own research with the World Economic Forum finds evidence that closing skills gaps (which is also achieved via on-the-job training and other forms of lifelong learning such as micro-credentials) translates into productivity gains which would then lead to higher earnings for workers.³⁹ Numerous firm-level studies demonstrate the positive effects of human capital investment on firm productivity, profitability and innovation.⁴⁷ As for governments, a study by the OECD suggests that the costs of providing one year of training to all people in at-risk jobs due to automation would cost the equivalent of 0.5%-2% of GDP at the lower bound, and up to 10% of GDP in certain scenarios. These costs would likely be more than offset by the benefits to the economy, especially if we consider the benefits to society as a whole.⁴⁸

The economic case for upskilling is significant, why is it that people and businesses do not upskill themselves and their workforces more?

Given the accelerating level of disruption across global marketplaces, one might expect that the amount of upskilling is at least increasing. Yet upskilling appears to be on a downward trend in many countries. For example, in its 2015 Economic Report of the President, the US Council of Economic Advisers found that the share of the country’s workers receiving either paid-for or on-the-job training had fallen steadily between 1996 and 2008. More recently, in the UK, the average training days per employee fell by around 14% between 2015 and 2019, from 4.2 days to only 3.6 days per annum. Financial constraints imposed on employers by the COVID-19 pandemic have hindered upskilling efforts globally as well. A CIPD survey finds that over 30% of the organizations reduced their learning and development budget in 2021.⁴⁹

The concern over skills shortages is shared by employees and employers alike. PwC’s 23rd Global CEO survey suggests that CEOs put the creation of a skilled, educated and adaptable workforce at the top of their priorities of social outcomes that business should help deliver.⁵⁰ However, only one in three employees felt that they had been given the opportunity by their employer to develop the digital and transferable skills they needed — and 77% of the 32,500 people surveyed said that they were ready to learn new skills or completely retrain.⁸

If people have the motivation to upskill themselves, and if the return on upskilling is positive for employees and employers, why do people not upskill themselves more? Why are economies still hampered by skills shortages? What can policymakers do about this?

Overcoming Barriers to Upskilling Through Skills Policies

Although the private market for upskilling has not been able to satisfactorily resolve skill shortages, government intervention may be a substitute. This chapter examines the frictions and failures of the market and identifies where government intervention may be called for.

“The role of government is to ‘grease’ the labor market.”

Fabio Manca, Organisation for Economic Co-operation and Development

There are at least three types of barriers to upskilling: dispositional (behavioral drivers), situational (circumstances faced) and institutional.⁵¹ In **Figure 4.2**, we add informational and financial as additional types of barriers, and use this expanded framework to classify the responses of a survey conducted by the UK government in 2019 on 3,660 people who were asked why they had not upskilled themselves in the last three years.⁵² Dispositional and situational barriers loom largest, with lack of interest cited as the number one reason; work and other time pressures were the second largest barrier; a close third was a feeling that they were “too old”.

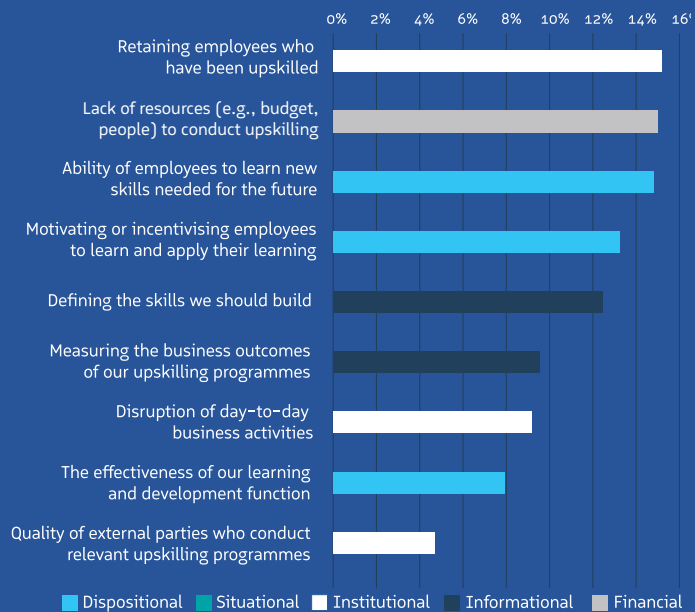
Figure 4.2 - Barriers to Upskilling, as Reported by Individuals⁴⁵





PwC's global survey on technology, jobs and skills sheds light on the barriers faced by businesses.⁵³ The biggest concern is the difficulty of retaining employees who have been upskilled, followed closely by a lack of resources and a scepticism regarding the employees' ability to learn new skills. Informational barriers are also a key challenge for businesses, both in terms of defining the skills that are required and determining the effectiveness of upskilling programs.

Figure 4.3 - Barriers to Upskilling, as Reported by CEOs



Source: PwC (2020). 23rd Annual Global CEO Survey

These surveys shed light on the upskilling puzzle, as they outline the complex, and in some cases, insurmountable, barriers to upskilling that prevent people and businesses from upskilling, even if it is in their own interest. The prevalence of dispositional and situational barriers highlights the imperative for policy makers to take a human-centered approach, starting with a deep understanding of the behavioral barriers faced by individuals.

Governments should not seek to redress all barriers. They ought to focus on those that are indicative of market failures⁵⁴, and that can be addressed. As an example, the fact that businesses are so concerned about losing upskilled talent is indicative of a type of market failure known as externalities (in this case an external benefit), which could be corrected if employers were somehow able to be compensated for their investment in the instance that they lose an upskilled worker.⁵⁴

Broadly speaking, market failures can be seen as inhibiting upskilling in two ways:

- **Quantity of upskilling:** Optimizing the level of upskilling. The current level of upskilling is sub-optimal, particularly in growth areas such as the digital and green economy.
- **Quality of upskilling:** Maximizing the benefits of upskilling. Skills gaps and skills mismatches also emerge if upskilling is not of the right type or quality.

The table below explains how different types of market failures hinder upskilling and captures the role that government can play in addressing these failures.

Table 4.2 – Potential Market Failures and Role of Government to Enable Upskilling at Scale

Potential Market Failure	Potential Role of Government
Quantity of Upskilling: Optimizing (AE) the Level of Upskilling	
<p>Behavioral Biases Underconfidence, fear of failure, ageism, short-termism and a host of other behavioral biases put people off upskilling even when it is in their own interest. These biases result in a Matthew Effect, whereby high skilled people undertake more upskilling than low skilled people, entrenching digital divides⁴⁸ and other inequalities.^{48, 55}</p>	<p>Nudges and Culture Change Behavioral economists advocate “nudges” to correct behavioural biases, which can be tailored to different segments of society.⁵⁸ Aside from individually targeted nudges, governments can instil a culture of lifelong learning in which people feel empowered to learn throughout the course of their life.</p>
<p>Poaching Externality Problem 14% of CEOs say that retaining upskilled workers was the single biggest challenge associated with upskilling programs.⁵⁹ If the next employer benefits from another organization’s investment in upskilling, this constitutes an external benefit which leads companies to upskill workers less than if they were to enjoy the full fruits of their upskilling programs.</p>	<p>Incentives Externalities can be remedied by aligning benefits with costs. There is mixed evidence on the efficacy of incentive-based interventions such as employer payback clauses, subsidies and minimum training expenditure mandates backed by levies on companies that do not undertake sufficient investment in upskilling.⁵⁹</p>
<p>Social Externality Problem Upskilling can also deliver broader benefits to society beyond the worker undertaking the upskilling. An upskilled worker is more productive at work, benefiting the entire organization. This externality, however, may incentivize others to undertake less upskilling initiative than is optimal for society as a whole.</p>	<p>Social Rights Governments have long considered child education to be a human right. Given that automation, globalization and other trends are increasingly excluding people from the workforce, there is a mounting case to also consider adult education a right, in which case governments would have a duty to ensure everyone has the opportunity to upskill themselves.⁶⁰</p>
<p>Liquidity Constraints The World Economic Forum recently estimated that it costs on average \$24,000 to reskill a displaced worker.⁵⁶ Upskilling, even if it was significantly cheaper than this, is unaffordable to many, especially those who are unable or unwilling to obtain a loan.</p>	<p>Welfare Reform and Financial Support Schemes such as the UK’s recently announced Lifelong Loan Entitlement can help fund adult education and thereby give people a second chance at education.⁶⁴ Governments may also need to redesign welfare systems to encourage upskilling as a means of transitioning between jobs, even if this results in unemployment.</p>
<p>Discrimination Discrimination, across a wide variety of different categories and demographics, is inefficient as well as unfair. Evidence suggests that discrimination can be a barrier to upskilling.⁵⁷</p>	<p>Labor Law Discrimination is illegal. Corporate reporting on interChapteral upskilling gaps could help reveal the prevalence of this type of discrimination in the workplace.</p>

<p>Bundling</p> <p>Education often comes in bundles: You cannot get half a Bachelor’s degree, even if this is all that would be enough to kickstart a new career. If courses were more flexible, both in terms of their size but also in terms of the way they are delivered (e.g. distance learning) and time commitments (e.g. full-time vs part-time) then this would alleviate situational barriers such as the demand of childcare or working while studying.</p>	<p>Best Practice and Regulation</p> <p>The pandemic has accelerated the growth of distanced learning. Educational best practice and potentially regulation could play a role in enhancing the flexibility of training, for example by “unbundling” courses so that learners can take individual units and earn micro-credentials in return.⁶²</p>
<p>Quality of Upskilling: Maximizing the Benefits of Upskilling</p>	
<p>Collective Action Problem</p> <p>It is in the mutual interest of employers and academic institutions for courses to provide individuals with skills that are in demand. However, there is no common demand signal visible to all players. The fact that employers have not come together to provide institutions with information that it is in their common interest may be indicative of a collective action problem, as businesses would benefit from the service without paying for it (“free riding”).</p>	<p>Public-Private Coordination</p> <p>In time, the open market will respond to market signals. To accelerate this, however, an end-to-end value chain approach is needed to encourage effective collaboration across the public and private sectors, including non-governmental organizations (NGOs). This information should also be available to individuals seeking to enter or transition across the job market, for example in the form of job transition optimization tools.⁶³</p>
<p>Information Asymmetry</p> <p>In an idealized labor market, not only would employers be able to share or signal the skills that they require, employers would be able to know whether prospective employees possess the requisite skills. Some degree of information asymmetry in the hiring process is unavoidable but this should be minimized to avoid the effects of adverse selection (i.e. hiring the wrong person for the job).</p>	<p>Standards</p> <p>Degrees act as effective (albeit imperfect) signals of specific skills and a general capacity to learn. “Unbundled” micro-credentials would be effective signals only if there is a degree of standardization, such that employers can benchmark potential recruits with different qualifications against each other.</p>
<p>Imperfect Information</p> <p>Information asymmetry is also present when businesses evaluate the potential of current employees to upskill or reskill themselves into new roles. Evidence suggests that employers could save money if they better appreciated the flexibility of their current workforce.</p>	<p>Evidence-Based Research and Dissemination</p> <p>Although we have presented evidence of the benefits of upskilling, there is a general lack of evidence on the benefits associated with specific types and methods of upskilling. Governments should seek to provide evidence if the market fails to, and it should promote evidence where biases exist, for example if employers underestimate the capacity of employees to learn.</p>
<p>Geographic Immobility</p> <p>Geographic immobility is considered a labor market failure if there are skill shortages in some locations which could be offset by a surplus of the same skills in other locations.</p>	<p>Place-Based Policy</p> <p>Governments can adopt place-based policies which upskill workers based on local skill shortages.</p>

Source: PwC analysis

The case for government intervention will only become stronger as megatrends such as digitalization and decarbonization exacerbate the costs of ignoring market failures.

Supporting the Creation of Good Jobs Through Industrial Policies

Successful upskilling policies will create a cohort of newly upskilled workers to meet anticipated demand in green and digital sectors. But supply does not always create its own demand — in the Middle East and North Africa (MENA) region for example, youth unemployment stands at 30%, twice the global average, despite significant investments in education.⁶⁴

Yet, the dominant policy approach to youth unemployment and underemployment in emerging markets has often been the funding of skills-building programs that seek to enhance the employability of young jobseekers. This implies that the youth employment challenge in emerging markets is primarily a problem stemming from the unemployability of young people, rather than a scarcity of good jobs.⁶⁵

What about the demand side? This is where industrial policy has a role to play: Through industrial policies and collaboration with the private sector, governments can help create quality jobs aligned with skills in supply, eventually building a skills ecosystem where the supply and the demand are balanced.

In recent decades, Nordic countries have shown how a government-led approach to skills can be aligned with innovation and the creation of jobs in higher-value-add sectors. Stakeholder collaboration and the engagement of workers play a key role. Workers are encouraged to search constantly for new skills (supported by strong social protection) and are also included in the ongoing redefinition of job roles. This enables firms to decentralize responsibilities to operative levels, making possible new forms of learning within organizations where control rests in the hands of workers. This in turn facilitates innovation of new services and products within the economy.⁶⁶

Our analysis of threats and opportunities from the advent of the green economy suggests that demand-side policies may be especially needed in oil- and resource-rich economies, where governments have historically relied on fossil fuels as a source of finance, energy and jobs, but now need to support growth in green sectors and decarbonization efforts. Governments could consider industrial policies to support and promote numerous sectors including the circular economy, biomaterials, urban food production, sustainable architecture and other domains which foster smart green lifestyles.

Directed Technological Change

Directed technological change can provide a much-needed boost to the demand side.

There is, understandably, deep scepticism about the ability of policymakers to correctly identify and direct technological change in a way that enhances welfare by targeting specific technologies to support. This carries the risk of locking in the economy into a sub-optimal trajectory.⁶⁷ The pitfalls of picking winners, or implementing policies designed to promote industries that appear promising while sunsetting declining ones, are well-known.⁶⁸

However, the meaning and objectives of industrial policies today are not the same as in the past. Indeed, government intervention to stimulate demand is not about top-down planning; it is about providing a direction for growth, catalyzing activity that otherwise would not happen, and increasing business expectations about future growth areas.⁶⁹

This argument appears to be the strongest in the context of climate change policy. There is growing evidence that under certain assumptions, directed technological change as part of a policy mix is more efficient than one that the market would achieve on its own. For example, Acemoglu et al. (2012) show that targeted R&D support for climate change mitigation technologies, together with a carbon tax, would lower the cost of meeting climate change mitigation objectives in comparison to a carbon tax on its own.⁷⁰

Aghion et al. (2010) also show that the path-dependent nature of climate change innovation might lead companies to innovate in the wrong direction in a free market.⁷¹ A famous example of path dependence causing technology to develop in a sub-optimal way is the QWERTY keyboard. Although it was originally designed to slow typing speeds to prevent typewriters from jamming, it has nevertheless won the battle of dominance as keyboards came into common usage with the rise of personal computers.

A similar argument applies to incumbent dirty innovation, such as fossil-based energy generation and combustion engines, trumping clean innovation, such as renewable energy generation, batteries and electric vehicle technology. As Aghion et al. (2015) argue, the presence of path dependence and strong inertia can cause scientists and innovators to focus on advancing dirty technologies, which further locks the economy in fossil fuels.⁷² Directed technological change can correct this by giving the system a push in favour of clean innovation to overcome switching costs and deep-seated inertia.⁷³



“Industrial policy is no longer about protectionism of domestic industries and picking winners; it is about creating future value with the right strategic direction.”

Till Leopold, World Economic Forum

Indeed, many of the most consequential innovations in the last century — from early computers to the internet — were spearheaded by governments and sustained by generous government support. These breakthroughs gave rise to new and productive opportunities for workers and demonstrated that the direction of technological progress is not inevitable. It can be altered by economic incentives, and therefore be influenced to some extent by governments. Directed technological change can tilt the playing field in favor of desired societal goals, such as the Sustainable Development Goals, including the creation of good quality jobs (living wage, stable employment, upskilling and training opportunities) for skilled workers that are productive and aligned with environmental objectives at the same time.

“As a society, we should care not just about how much innovation takes place, but also about the types of new technologies that are developed. We ought to ensure we are investing in technologies that are safe, environmentally sound, empower rather than simply replace human labor, and are consistent with democratic values and human rights.”⁷⁴

Dani Rodrik, Harvard University

Mission-Oriented Innovation

One way to shape the direction of technology is through **missions**, as championed by Mariana Mazzucato, Professor in the Economics of Innovation and Public Value at UCL in London. Missions are a way of turning challenges into concrete problems to drive innovation. An essential component of a mission is a target, such as a net zero emissions target, set collectively by society (or delegated to policymakers).⁴¹ In a similar way that the mission to put man on the moon operationalized innovation in aeronautics, robotics, textiles and nutrition, the existence of a net zero target can steer private sector innovation, especially when it is backed by legal commitments. For example, the UK and France have legal commitments to achieving net zero targets, with legal consequences for failing to achieve these targets.

A crucial feature of missions is that they drive innovation without “picking the wrong winners,” in the sense that they do not favor a specific type of solution or technology (for example, the source of renewable energy). This remains largely for the market to determine. In this way, governments can shape technological progress in a way that contributes to wider societal objectives whilst minimizing economic distortions.

Modern mission oriented approaches, such as Germany’s Energiewende Policy to combat climate change, and the Paris Agreement’s net zero target, show how policies can catalyze industrial growth in favor of future growth sectors.

Transitioning to a High-Skills Equilibrium

Governments should not assume that digital and green solutions will always lead to socially desirable outcomes, such as the creation of secure employment that provides living wages. In fact, the adoption of artificial intelligence to solve business problems has begun to polarize labor markets into high-skilled and low-skilled job clusters, such as the **gig economy** and **ghost work** (see **Box 4.1**).

There are no quick fixes that will edge countries towards a high-wage, high-skill and high-productivity equilibrium. It will require a concerted effort to incentivize employers to make a paradigm shift to strategies that place greater emphasis on skills, and away from relying on low-skilled labor.

Box 4.1 - The Challenge of Ghost Work

Technology can lead to the polarization of jobs. To see why this is, consider that while AI relies on high-skilled workers to identify and implement novel applications, it also requires people carrying out repetitive tasks to train algorithms, for example by manually labelling pictures or classifying legal documents. Once trained, many machine learning systems rely on people as essential inputs into the supply chain. Businesses have been criticised for deploying and monitoring gig workers as they would cogs in a machine. The input of these types of workers into machine learning systems is often invisible (hence why Gray and Suri (2019) coin the term “ghost work”) and the workers are therefore overlooked as a growing global class of citizens with poor pay and poor rights.⁷⁵

Overcoming this problem requires a combination of skills and industrial policies. Otherwise, there is the risk that low skills in regional or national economies are self-perpetuating, creating low skills equilibria: a situation where businesses do not invest in innovation in a given location because there are not enough people with the relevant skills and, meanwhile, workers do not have a reason to upskill because there are no job prospects. This creates a vicious cycle of low-skill jobs, low demand for skills and low wages. This is the skills trap from which many economies are finding it difficult to escape, including in places such as the UK — even though there have been large investments in education and training.

A way out of this trap in specific locations, particularly in local and regional economies, is to invest in sectors that would leverage the skills already available. The potential productivity gains can then be re-invested in innovation that will create new jobs attracting new types of skills and talent.

“Decision-makers need to look at what jobs can be expanded based on the capabilities available today.”

William Hynes, OECD NAEC

As we advocate in the next chapter, unleashing the skills economy will require governments around the world to have a new strategic vision, adopt policy frameworks that are more resilient to change, and new ways of working and collaborating, including across regions to meet local needs.



Chapter 5

How Governments can Unleash the Skills Economy





Governments can play a transformative role in addressing the supply-demand imbalance through skills and industrial policies. They can take an active role in several areas: in defining and spreading a skills-centered vision of economic development with lifelong learning as an engine, and secondly, operationalizing that vision. This chapter sets out our recommendations for how this can be achieved.

Developing a Skills-Centric Vision for the Economy

As we saw in Chapter 4, developing the skills economy, where the talents of people are used in conjunction with technology to achieve more sustainable prosperity, involves policy questions that go well beyond the realm of a narrow definition of skills development that focuses only on the supply side.⁷⁶ Skills also need to be linked to employment opportunities and decent work (the demand side) by embedding skills development within broader development strategies (e.g. industry sector development, local economic development, youth employment).⁷⁷

“A paradigm shift is putting skills development strategies at the center of wider developmental objectives – extending beyond the realm of a ‘Ministry of Education’ and becoming a national strategic issue.”⁷⁸

Laurent Probst, PwC

Having a skills-centric vision for the economy means:

- **Treating people as the key asset of the economy:**
Upskilling is the basis for competitiveness, inclusive growth and social cohesion. For this reason, skills development strategies need to be at the heart of policymaking and national economic strategies.
- **Taking a people-centered approach to policymaking:**
Removing barriers to lifelong learning will require coherent and creative policy development.⁷⁹ For example, welfare services such as childcare, elderly care and housing support may need to be strengthened in order to give individuals the time and space to learn. The potential synergy between skills policy and welfare policy has been a key focus in Nordic countries, with their emphasis on protecting people and not jobs. A people-centered approach to policymaking will also require governments to treat citizens as individuals, and tailor policies such as nudges to certain segments of society.⁵⁸ For example enabling learning to be delivered in bite-sized modules, rather than larger, set-piece learning.
- **Treating lifelong learning as a right:**
Adult education is increasingly being viewed by governments as a right on the ground that it is necessary for social and economic inclusion.

“Everyone has the right to quality and inclusive education, training and lifelong learning in order to maintain and acquire skills that enable them to participate fully in society and manage successful transitions in the labor market.”

The European Pillar of Social Rights

Singapore is a prime example of a country becoming a skills economy. With its emphasis on second careers and continuous learning, large parts of society are becoming ready to transition to new, better jobs as the economy evolves.⁸⁰

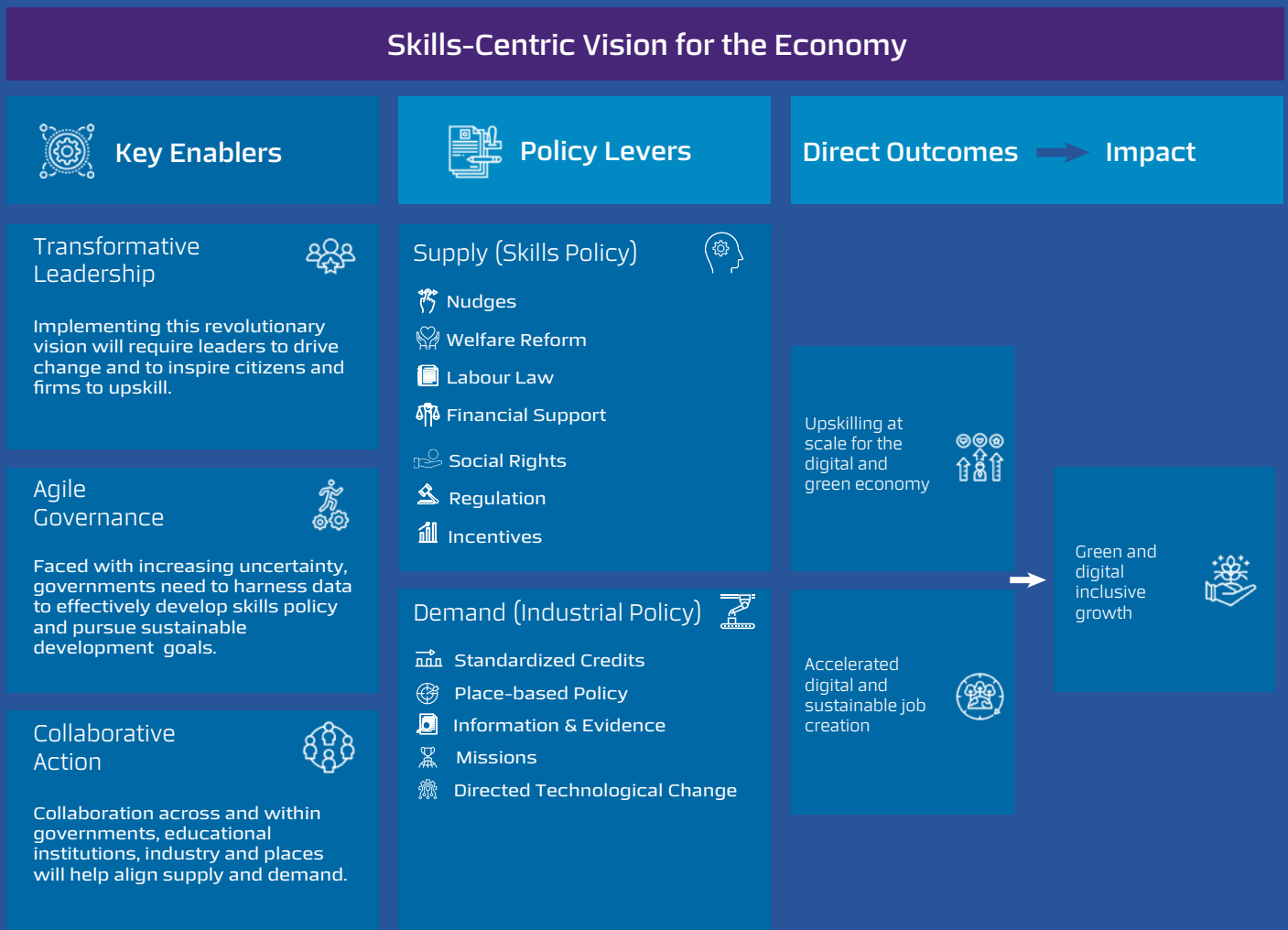
A paradigm shift such as the one observed in Singapore will not arrive as easily in emerging markets or even in developed countries with larger economies and more diverse populations. Laurent Probst of PwC points out that “many governments, including prosperous countries in the European Union for instance, have not been able to operationalize their ambitious skills-centered developmental strategies”.

To translate this vision into strategy and implementation, governmental reform and changes to the status quo are

needed. Governments, particularly those that are still struggling to fully comprehend the significant challenges brought on by changing demographics, technology and other megatrends need to revisit how they approach skills policy. Beyond this, more fundamental changes are needed in the way governments operate and implement policies and, furthermore, in how they collaborate and lead in a context of rapid transformations.⁸¹

Change is feasible and we have created a framework to guide policymakers (see **Figure 5.1**) to make the transformation to achieve a skills-centric economy via three enablers: Transformative Leadership, Agile Governance and Collaborative Action

Figure 5.1: Framework for a Skills-Centric Vision for the Economy





Enabler 1: Transformational Leadership

To successfully operationalize this skills-centric vision of the economy, transformational leadership is required: to drive change within government and to drive change in society more widely. People need to be inspired to push themselves out of their comfort zone, adopt a mindset of lifelong learning and take on new opportunities, including second careers that are expected to occur more often.

Drive Government Transformation

Leadership is needed to undertake the necessary organizational changes within government to adapt to fast changing economic conditions. Part of this transformation is the upskilling of the civil service, not only to meet the demands for technological competence and innovation but also to adopt more collaborative practices.

“In today’s world, governments need an entrepreneurial mindset and a culture that is less risk-averse when it comes to policy innovations and decision making.”

Margareta Drzeniek, author of the 2020 UN report *Future Possibilities*

Public service leaders — senior civil servants who lead and improve major government functions — are at the heart of government effectiveness. They translate political direction into the policies and programs that keep citizens healthy, safe and economically productive.⁸²

How can government leaders create agile and collaborative environments? They need to have both the right skills and institutional support to deploy them effectively. The OECD identifies four leadership capabilities that are necessary to respond to complex policy situations⁸³ — such as those being faced in the current context of rapid technological change and environmental challenges:

- **Values-Based Leadership:**
Negotiate multiple and often competing values to guide decision making towards the public interest.
- **Open Inclusion:**
Successful leaders challenge their own perceptions by listening to other perspectives.
- **Organizational Stewardship:**
Reinforce a trust- and values-based culture and equip the workforce with the right skills, tools and working environments.
- **Networked Collaboration:**
Collaborating through networks, with other government actors, and beyond.

Transformational leadership is what glues all the government enablers together: agile governance needs collaboration, which in turn needs an environment of trust. The latter is only made possible by good leaders that have the autonomy, tools, support, and accountability needed to effectively use their leadership capabilities. The OECD recommends leadership objectives that provide a clear sense of direction for leaders, aligned to the political objectives of the government.

Part of the readiness to develop the markets, jobs and skills of the future (as discussed in chapter 3) is for governments to be able to promptly collaborate and cocreate solutions with the private sector, but also with other levels of government and society at large as the pace of change accelerates.

To ensure policy alignment, governments need to define clear goals in a whole-of-government approach to policy, articulating the roles and responsibilities of different government agencies. Intra governmental responsibilities need to be clear and coordinated, with an alignment of incentives.⁸⁴ It requires common understanding of roles and responsibilities between the various authorities across the governance system.

A striking feature of Singapore is its whole-of-government approach to national talent development. Skills development is not just an issue of concern to the ministries of Education and Manpower, which lead the SkillsFuture Singapore and Workforce Singapore initiatives respectively — it is the focus of all ministries, within the scope of an all embracing Smart Nation Strategy.⁸⁵ Cocreation is an intrinsic element of the strategy, bringing together experts, brainpower (including talent from other countries), and stakeholders to find innovative solutions to challenges.

Drive Wider Change in Society

People need to be inspired and motivated to upend the old rules, habits and conventions of the labor market. They need to feel a sense of concern and consideration in order to help them self-actualise and upskill themselves. Leaders need to communicate skills strategies widely across the economy and society, and reassure citizens about ongoing transformations and what the future could and should look like.

Enabler 2: Agile Governance

In the context of the rapid change that characterizes the fourth industrial revolution, there is no silver bullet, no single policy that is always correct to permanently settle all skills and labor market challenges. Therefore, rather than putting forward specific policies for skills and employment, we need to define principles of good governance to be ready to face the challenges and opportunities of the future.

A principle is agile governance. Agility is the capability to sense and respond to changes in economic contexts — and businesses of all sorts have adopted organizing principles to do that. Just as businesses have adopted agile methods to help them meet the needs of their customers in a constantly evolving business environment, governments require agile policies to better meet the needs of their customers: citizens.⁸⁶

“If uncertainty is the new normal, then agility is the necessary response.”

PwC Future of Government report (2013)

Adaptation to changing economic and social environments can be achieved through principles of agile governance, as has been emphasised by the World Economic Forum and others.

A Starting Point is Adopting Principles Of Agile Governance as Follows:⁸⁷

1. Goal-Oriented Governance: Favoring Outcomes over Structures

Governments need the ability to break down high-level ambitions into testable components with clear, measurable goals. Defining overarching outcomes, in the form of ambitious upskilling targets, is vital given the scale of upskilling that will be required. Targets should be grand: for example India’s ambition to reskill three quarters of its future workforce.⁸⁸ A clear national ambition enables a whole-of-government mission to be adopted, with measurable goals and policy alignment (as further discussed in Enabler 3). Targets should also be granular and divided into milestones, allowing public programs to be broken down into components that are easier to implement and assess, including pilot programs.

2. Data-Driven Governance: Adapting to Change with Evidence

Software development is agile because developers proactively and routinely collect and analyze data in order to detect the need for change. Governments can develop policies in a similar fashion. Yet, the reality is that many countries still lack mature labor market data that allows for detailed and actionable forecasts of skills that will be in demand across geographies, industries and demographic groups.

Digital transformation is particularly vital in addressing data challenges. The potential applications are numerous:

- **Segmenting the population:**
Creating inclusive labor market policies will require an understanding of the characteristics and needs of different segments of the workforce such as youth, women, highly skilled employees, people with disabilities and others. In segmenting the labor force, governments improve the chances of employment policies being effective. Creating umbrella labor policies, especially in the field of lifelong learning, can be ineffective, as there are rarely one-size-fits-all solutions.
- **Determining the demand for skills:**
Future of work researchers use real time data sources such as job advertisements posted on LinkedIn and other job sites. Governments can use the same type of high-frequency data to inform their knowledge of the demand for skills.
- **Labor market information systems:**
Governments have made progress at merging data into more holistic and comprehensive information systems but real-time data can be collected on vacancies, skills and job requirements, disaggregated by geographies, industries and demographic groups.

In some cases governments can be a spur to the collection of data. For example, Singapore’s SkillsFuture requires employers to identify the skills needed over the next five years through regular surveys, with the results of which are used to inform the national skills framework and direct government-led upskilling efforts.⁸⁹

3. Policy Innovation: Shaping Resilient Policies with Prompt Piloting

The combination of goal orientation and the intensive use of data enables the policy innovation and adaptability needed for changing economic contexts. Technology is changing fast and many of the jobs that will employ wide segments of the workforce in the coming decade may not exist yet, which makes it difficult to anticipate the skills that are needed. As explained by Ekkehard Ernst from the ILO, governments around the globe are gradually moving from defining static optimal policies (i.e. policies that are assumed to be always correct) to dynamic resilient policies. By piloting and constant learning from policy impacts, governments can adapt to transformations as they arise rather than attempting to anticipate and resolve all potential economic scenarios. As outcomes emerge, they can be analyzed and the results used for future policymaking.

“Policies need to be forward-looking, instead of being based on what has worked well in the past.”

UN Future Possibilities Report (2020)

In response to uncertainty, countries such as Finland have adopted agile principles in order to facilitate experimental policy development (**Case Study 1**).

Case Study 1: Finland's Experimental Approach to Policymaking^{90,91}

In 2015, the government collaborated with think tanks to devise a method of trying new policies on a smaller scale before implementing them nationally. This approach allowed Finland to experiment with concepts such as Universal Basic Income and decentralized employment programs.

On the employment front, Finland has launched an experiment to integrate central government resources (The Employment and Economic Development Office, "TE Office") with local ones. Instead of directing job seekers to the TE Office, the pilot will see jobseekers directed to local municipalities, which will conduct projects to trial different methods of providing employment services and identify best practices.

The pilot seeks to capitalize on municipalities' knowledge of their specific markets and constituents, and to integrate employment, education, social and health services together, recognizing the need for multifaceted, comprehensive support. Localizing and integrating these services ensures that municipalities can develop services based on the needs of jobseekers and employers in their area. The results from the pilot will inform the central government's decision on a permanent structure for employment services during its term.

It is evident that being an agile, tactical government can help nations test policies quickly, determine their efficacy and decide on whether to enact them, all in a cost-effective manner. If the policy achieves the desired result, it can be quickly replicated (with minor tweaks), with some certainty of success as it has already been tried and tested.



Driving change in society is not only about communication, it is also about participation and inclusion. Public authorities from all levels of government increasingly turn to citizens to tackle complex policy problems. This “deliberative wave” has gained momentum in the last decade.⁹² OECD research finds that institutionalizing deliberative processes in participatory decision-making enables governments to improve practice by ensuring collective learning and experimentation (which is what is needed to activate Enabler 1), and can increase trust in government, strengthen its legitimacy, and enrich civil society by creating more opportunities for more people to significantly shape public decisions.⁹³

As recognised by the OECD, there is no one size fits all approach; it depends on the context, purpose, and process. One of the objectives of the framework is to help governments find guiding principles for good governance, to become more agile, collaborative and participatory - which are the features that will allow governments to adapt to our times of rapid, sometimes disruptive, transformations.



Enabler 3: Collaborative Action

A feature of agile governance is the ability of governments to promptly collaborate and cocreate solutions with the private sector, other levels of government and society at large as the pace of change accelerates.

Governments and businesses increasingly recognize the value of upskilling wide segments of the population. And often they are willing to invest in it. Yet, the multitude of skills initiatives from the private sector and different levels of government can lead to excessive fragmentation of policies and strategic misalignment. In the MENA region, the lack of coordination between different implementing organizations, be it the government or private sector, has limited the impact of interventions in youth employment.⁶⁴

Nurturing the Skills Ecosystem

A people-centered vision for national economic development should start with extensive consultations with educational institutions, trade unions and corporations, determining how such a vision should look in practice and what it means for people and businesses.⁹⁴ A year-long consultative approach involving multiple partners and institutions led to the birth of India's first National Policy on Skills Development in February 2009, which is helping coordinate action.⁸⁸ Consultations can also involve citizens in more participatory policymaking: a young lens can be added to public governance by integrating the youth to governance processes via open government tools — mainly facilitated by digital technologies. We explain how participatory policymaking can also drive wider change in society (Enabler 1).

From a more practical perspective, a specialized taskforce with the appropriate technical capacity and authority to muster political support can help set up initiatives such as:

- Workforce development boards that convene businesses, labor unions, governments and training service providers (e.g. schools and private sector companies) to link jobs to skills, tailor training curricula to meet actual job requirements and generate apprenticeship possibilities for first-time jobs.
- Regional and industry-specific networks that bring together public and private training providers (colleges, universities, other training providers), employers, industry representatives, unions, labor market and training intermediaries.

In Singapore, tripartite Sector Skills Councils (SSCs) help specific industry sectors define and close its skills gaps.⁸⁹ These groups typically collaborate with relevant government bodies to provide representatives from employers and workers organisations with information about newly critical skills. In the UK technology sector, Tech Partnership Degrees is an SSC that brings employers and universities together to “improve the flow of talent into the digital workforce.”⁹⁵ Similar groups can be found in Denmark, the Netherlands, South Africa, Singapore, and Argentina.

“The participation of businesses reduces skills mismatches while the participation of unions is associated with better equity outcomes such as improved access of women, unemployed, low skilled workers and migrants to training. It also helps to ensure that increases in productivity resulting from better training are translated into higher wages.”

Catherine Saget, International Labor Organization.

Job progression initiatives that are designed through a collaborative process between employers, employees and skills providers can serve both employers, by addressing the skills gaps and improving productivity, and the workforce by meeting training needs and providing progression opportunities.

For example, the UK government's Skills for Jobs white paper, published in January 2021, details plans to boost flagging skills and productivity by giving employers a say in the design of college courses and qualifications that will be aligned with their needs. The reforms will seek to encourage the growth of new higher-level vocational and technical qualifications. Education Secretary Gavin Williamson said the reforms will ensure “all technical education and training is based on what employers want and need, while providing individuals with the training they need to get a well-paid and secure job.”⁹⁶

Coordinating for Policy Alignment

To pursue national and economy level objectives, collaboration is also needed within government.

The array of market failures which have held back the skills economy can be substantially mitigated if governments collaborate across policy domains. Chapter 4 makes the case for aligning skills policy with industrial policy, to ensure that the supply of skills will be matched by a demand for jobs in strategically important industries — the case study of Ireland gives an example of how to do that (**Case Study 2**). Furthermore, there are also trade-offs across policy domains (e.g. between employment and environmental policies) that need to be managed across government.⁹⁷

Case Study 2: Policy Coordination in Ireland to Align Supply and Demand⁹⁸

The Expert Group on Future Skills Needs (EGFSN) was set up in 1997 by the Irish government. The EGFSN was tasked with monitoring all sectors of the Irish economy and identifying current and future skills shortages. Its board was made to be representative and inclusive, with members from government departments, scientific and research institutions and social partners. The information generated by the skills identification system is translated into skills development programs. The EGFSN also serves as an advisor to ministries responsible for education and enterprise development, trade and employment. Its involvement with these different branches ensures policy coherence in the skills development system.

Through the EGFSN, Ireland's skills, industrial, labor market and research policies are interconnected through a network of interlinked organizations and an institutional framework that enables effective policy coordination between policy areas. The social partners serve as important sources of information, consultants and sustainers of the process. There have been improvements in the matching of skills demand and supply through policy coordination and shared responsibilities. Source: International Labor Organization

Defining missions, as described in chapter 4, can bring government agencies and departments together with a common purpose. Clear key performance indicators, clear responsibilities, strong capacity for coordination and effective accountability will help unite policies to achieve specific upskilling goals – and wider developmental goals. For instance, Norway has used a whole-of-government approach to attain upskilling objectives (Case Study 3). The big, national-level goals can then be broken down into missions with intermediate measurable objectives that can be pursued with the right inter-ministerial expertise and capabilities – and in collaboration with the wider stakeholders.

Case Study 3: Norway's Whole-of-Government Approach⁹⁹

Norway adopted the Norwegian Strategy for Skills Policy in 2017, aimed at developing skills strategy by incorporating a whole-of-government approach and strong stakeholder involvement. While the government cooperated with social partners to develop and implement the skills policy, it tasked municipalities – as the main managers of schools – with providing educational services to citizens.

Additionally, the Committee on Skills Needs, which consists of 18 members representing social partners, ministries, and researchers, is responsible for compiling evidence on Norway's future skills needs, contributing to open discussions and better utilization of resources between stakeholders, and produces an annual report with analyses and assessment of Norway's future skills needs. These skills are projected at the national, regional and sectoral level.¹⁰⁰

Some countries such as India have used missions and targets to drive a holistic approach towards inclusive upskilling (see **Case Study 4**). The goal of Skill India is to reskill three quarters of the estimated future workforce of 400 million by 2022.¹⁰¹

Case Study 4: India's Coordinated Approach to Inclusive Upskilling^{101,102}

The challenge of educating and training India's vast population is huge: more than 90% of the workforce is engaged in informal employment and, of the 500 million people under the age of 25, 30% are not in employment, education or training. In addition, the participation of women in the labor market is low.

The government is taking a holistic approach to tackle this by linking skilling, livelihoods and entrepreneurship. The goal of its Skill India mission is to reskill three quarters of the estimated future workforce of 400 million by 2022. To achieve this it has created 38 Sector Skill Councils, which have more than 600 corporate representatives.¹⁰³ Additionally, the recently introduced National Education Policy aims to mainstream skilling across the school and higher education ecosystems in India.

A key feature is to upskill inclusively, with a strong focus on the many self-employed people in the informal sector at the bottom of the pyramid.¹⁰⁴ This includes helping people receive formal recognition of their skills and providing basic training so they can become grassroots entrepreneurs in the agriculture and allied sectors, traditional handloom/ handicraft sectors and others.

Over the last 15 years, PwC has worked closely with donor agencies, the private sector and government on the skills agenda. In 2018, PwC supported a program in the south of India that trained more than 200,000 young people, increasing their employability by 39%. PwC also worked closely with a donor agency and a national commission to build the entrepreneurial capacities of more than a million traditional artisans to enhance their business skills.

Coordination is also important because policy packages that facilitate upskilling and occupational transitions will have to go well beyond the educational sector, including measures to facilitate occupational and geographical mobility (e.g. housing policies,¹⁰⁵ occupational licensing), tax policies or welfare and unemployment insurance schemes that are compatible with upskilling.

Cross-governmental collaboration is needed to provide holistic support to workers beyond preventing them from losing their jobs or making it difficult for employers to let go employees.

The central flaw of traditional employment protection systems is that they protect jobs regardless of whether they are productive or in a strategically important industry, and research has found that more lenient employment protection legislation (EPL) results in an increased number of workers trained by firms, which highlights the potential adverse effects of EPL on training.¹⁰⁶

Some northern European countries have had success developing a skills economy using a holistic approach to supporting people via welfare policy. Nordic countries have taken a social protection approach which focuses on protecting people and not jobs, that is enabled by cooperation between labor market and social security institutions. The idea is to move away from a model that relies on employment protection schemes to guarantee “lifelong employment” and towards a model in which people are guaranteed “lifelong employability.”¹⁰⁷

The Nordic Flexicurity Model, as it has become known, avoids this flaw while increasing labor market flexibility.

Coordination Across Places

Economists have historically overlooked the need for place-based policy by overestimating geographical mobility in the labor force. One response to the latter is to increase geographic mobility, involving the coordinating of policies around housing, transport and other attractors of talent to places.

“You need a mobility strategy alongside a skills strategy.”

Fabio Manca, Organisation for Economic Co-operation and Development

Another approach is to develop skills policy on the assumption of an immobile workforce. In fact, such is the reluctance of people to move places, that academics and policymakers increasingly argue that there is no such a thing as a national skills equilibrium for larger countries and that policy ought to be defined in terms of local skill ecosystems.¹⁰⁸ The long term impacts of COVID-19 on the way we live and work (the rise of working from home,

offices as meeting and collaboration spaces etc.) will also have important ramifications for place-based policies if people tend to stay in smaller towns.

Chapter 4 explained the risks of local economies getting trapped in low skills equilibria. The case of Denmark’s Hovedstaden region provides examples of collaboration to effectively transition from a low to high-skill economy (**Case Study 5**).

Case study 5: Using Place-Based Policies to Address Challenges in Denmark’s Hovedstaden Region¹⁰⁹

On the place-based policy front, Denmark offers real-life examples to learn from. The Capital Region of Denmark (Hovedstaden) identified the challenges it has faced in tackling unemployment. These barriers include the lack of qualified workers and skills critical for growth, the undersupply of international talent and the lack of collaboration between private and public companies. To address these, the regional council promoted investments aimed at strengthening continuing training programs for adults through on the job training and recognition of qualifications. It has also increased skills development in Subject Matter Experts (SMEs) and partnered with southern Sweden on educational programs and internships. Lastly, this plan focused on strengthening the region’s talent development efforts through building a regional knowledge center for public-private cooperation to ensure knowledge sharing across all levels.

The objective of a place-based policy is to create high skill ecosystems, characterized by competitive advantage, high wages and a strong capacity for innovation. Place-based policies have the potential to upskill populations for the future of work and also achieve regional economic convergence at the same time, especially if they are targeted at economically underperforming regions. However, coordination is necessary to avoid displacement effects causing zero-sum gains, as has been observed to some degree in the UK when areas just outside place boundaries lose out.¹¹⁰

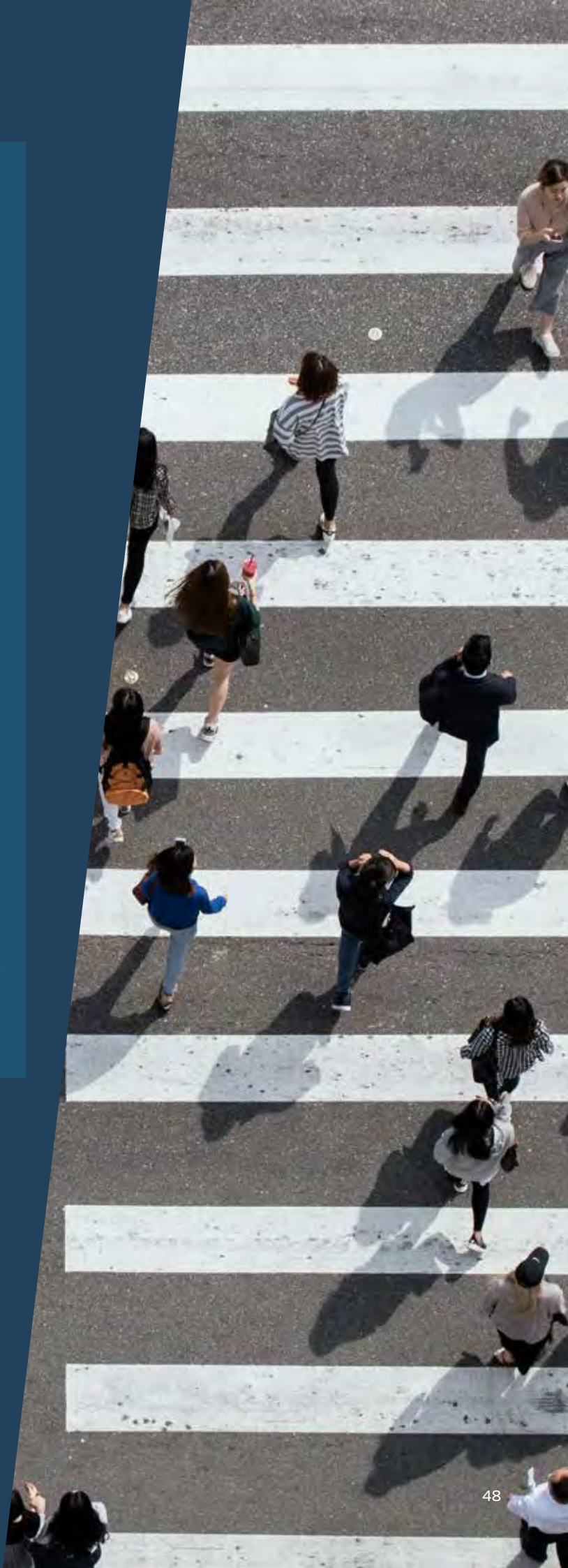
An effective place-based policy involves leveraging local strengths to achieve regional specialization, while being coordinated in the context of national industrial strategies, as exemplified by the case of England’s West Midlands (**Case Study 6**).

Case study 6: Place-Based Policies in England's West Midlands^{61,111}

An example of a place-based effort comes from the UK government's National Retraining Scheme. The program, Beat the Bots comes against the backdrop of a regional vacancy survey, which suggested that the most demanded positions were related to software, data, and cloud computing. This demand was met with a lack of candidates qualified at technician level, where most vacancies usually are. The sector grew in the region by over 33% between 2011 and 2016, and is estimated to employ upwards of 100,000 people by 2030.

"Beat the Bots" targets unemployed people in need of skills and training and those employed in low-wage markets and at risk of automation. It has used an employer led approach to train up to 1,900 people in the region from 2019 to 2022. The courses provide participants with specific digital skills in areas such as cybersecurity, full stack web development, machine learning and project management.

Supporting an end to end approach, each course participant is guaranteed an interview. According to the UK Department for Education, employers have given positive feedback, highlighting the motivation of participants and the level of practical skills they have developed. One employer said: "The nature of the bootcamp setup here is that it gets you into a job." As of October 2020, the bootcamps had engaged 800 residents, of whom approximately 50% were unemployed when they started. While the majority are still in training, the program aims to get 70% into jobs upon completion. Support has also been given to 100 of the 107 previously unemployed people who finished the bootcamps and started meaningful employment.



Conclusion



The world is on a cusp of a paradigm shift wrought by the twin green and digital transitions. The forces at play have the potential to displace millions of people from jobs, but it will also create new industries, and with it, new jobs. Policy-makers face the imperative to enhance the resilience of the labor market and prepare their workforce for these seismic shifts and seize these opportunities.

The economic case for upskilling is clear. The growth of human capital through upskilling not only delivers improved productivity and innovation; it also creates a more flexible and adaptable workforce that have the necessary skills to survive, and indeed, thrive in a highly digitalized and environmentally-conscious world. More importantly, access to training and learning opportunities can deliver tremendous social benefits, from improving individual wellbeing and health, to reducing crime rates and creating stronger societies. The changes to how we live and work as a result of COVID-19, only strengthens the case for upskilling.

Our analysis of the “upskilling puzzle” shows that many countries are failing to prepare their citizens to cope with change. Skills gaps are not only pervasive, but are widening, and only a few countries have managed to effectively align skills and innovation policies. Many countries risk not only losing out on the potential opportunity for growth, but also exposing large segments of their population to job losses.

This is an opportunity for governments and societies to address one of the biggest challenges in our lifetime. Our study highlights some of the barriers and market failures that are holding back progress. Addressing these not only requires supply-side policies that boost the skills, knowledge and productive capacity of the workforce, but also concerted demand-side policies to create the demand for a new generation of workers, such as through modern industrial policy. Our study provides some ideas for how both supply and demand side policies can work together to catalyse the creation of a skills ecosystem.

Designing and implementing the right policies is important, but to transform policymakers' vision for a skills-centric economy into real strategy, governmental reform is needed.

To unleash the skills economy, policymakers need to act now by incorporating the principles of Transformative Leadership, Agile Governance and Collaborative Action to inform not only the approach to policy, and ensuring that the skills agenda is placed at the heart of national economic strategies.

Uniting governments behind skill-centric visions for the economy and embracing new ways of governing will be challenging, but nonetheless achievable. We strongly believe that this is a critical element in navigating global megatrends and moving economies forward to a more sustainable and inclusive society, while ensuring good quality jobs for future generations.

Appendix 1

List of Case Studies

- **Case study 1:** Finland's Experimental Approach to Policy Making
- **Case study 2:** Policy Coordination in Ireland to Align Supply and Demand
- **Case study 3:** Norway's Whole-Of-Government Approach
- **Case study 4:** India's Coordinated Approach to Inclusive Upskilling
- **Case study 5:** Using Place-Based Policies to Address Challenges in Denmark's Hovedstaden Region
- **Case study 6:** Place-Based Policies in England's West Midlands



Appendix 2

Figures and Tables

List of Figures

Figure 2.1 - Digital Economy: Job Threat and Opportunity Level	12
Figure 2.2 - Countries are Committing to Net Zero Emissions Targets	14
Figure 2.3 - Green Economy: Job Threat and Opportunity Level	15
Figure 2.4 - AI for the Environment Headline Results for Global GDP and GHGs25	16
Figure 2.5 - H-Shaped Model of Skill Competencies	18
Figure 3.1 - Skills Mismatches Across OECD and 7 Non-OECD Countries,	20
Figure 3.2 - Graduates in Science, Engineering and Construction as % Of All Tertiary Graduates	21
Figure 3.3 - Relationship Between Companies Reducing Skills Gaps and Collaboration with Government-Academia	22
Figure 3.4 - Performance of Selected MENA Countries in Global Innovation Index (GII) and Global Talent Competitiveness Index (GTCI)	23
Figure 4.1 - The Boost to GDP from Large-Scale Upskilling (as a % of GDP)	25
Figure 4.2 - Barriers to Upskilling, as Reported by Individuals ⁶⁹	27
Figure 4.3 - Barriers to Upskilling, as Reported by CEOs	28
Figure 5.1 - Framework for a Skills-Centric Vision for the Economy	37

List of Tables

Table 2.1 - Emergence of Cluster of Professions of the Future, 2020-2022	17
Table 4.1 - The Economic and Non-economic Benefits of Upskilling	26
Table 4.2 - Potential Market Failures and the Role of Government to Enable Upskilling at Scale	29

List of Boxes

Box 2.1 - Automation and Emerging Markets	13
Box 4.1 - The Challenge of Ghost Work	33

Endnotes

1. The content of this report remains the responsibility of the authors.
2. The interview with Carlota Perez took place as part of the research of the joint WEF/PwC publication “Upskilling for Shared Prosperity.” See WEF & PwC (2021). Upskilling for Shared Prosperity.
3. ILO (2021), “ILO Monitor: COVID-19 and the world of work. Seventh edition. Updated estimates and analysis.”
4. PwC (2018), “Will robots really steal our jobs?”
5. Microsoft & PwC (2020), “How AI can Enable a Sustainable Future.”
6. PwC (2020), “23rd Annual Global CEO Survey: Navigating the rising tide of uncertainty.”
7. WIPO (2020), Global Innovation Index (GII 2020); INSEAD (2013), Global Talent Competitiveness Index (GTCI 2020); Malik A. & Awadallah, B., “The Economics of the Arab spring,” *World Development*, 45, 296–313.
8. PwC (2021), “Hopes and fears 2021.”
9. The skills trap, or the low skills trap, is characterised by a low skills equilibria, where sectors or countries experience low productivity and slow growth in real incomes. Limited demand for high skilled labor constrains the ability of firms to innovate and create more productive (and more highly-paid) employment, thus reducing the incentives for training. This in turn, creates a feedback loop as workers are disincentivised from investing in their skills due to the lack of more rewarding opportunities, which in turn, reinforces low value-adding and low-wage employment.
10. Particularly in the MENA region despite significant investments in education
11. Mazzucato, M. (2021), *Mission Economy: A Moonshot Guide to Changing Capitalism*, Allen Lane publishing.
12. Fabian Society (2019), “Commission on Workers and Technology Report.”
13. OECD (2020), “The Future of Work.”
14. We use the same definition of upskilling as in WEF & PwC (2021): upskilling refers to the expansion of people’s capabilities and employability so they can fully participate in a rapidly changing economy. In practice, the term “reskilling” is often used to refer to the specific case of someone acquiring a whole new skills set in order to pivot to a new kind of role.
15. George, G., Howard-Grenville, J., Joshi, A., & Tihanyi, L. (2016), “Understanding and tackling societal grand challenges through management research,” *Academy of Management Journal*, 59(6): 1880–1895.
16. Milanovic, B. (2016), *Global Inequality: A New Approach for the Age of Globalization*, Harvard University Press.
17. Boeri, T., Brucker, Docquier, F. & Rapoport, H. (2012), “The Effects of Brain Gain on Growth, Investment, and Employment: Evidence from OECD Countries, 1980–2005.”
18. PwC (2019), “Will robots really steal our jobs? An international analysis of the potential long term impact of automation.”
19. WEF (2020), “The Future of Jobs Report.”
20. Michaels, G., Natraj, A., and Van Reenen, J. (2014), “Has ICT polarized skill demand? Evidence from eleven countries over twenty-five years,” *Review of Economics and Statistics*, 96:1, 60–77.
21. Rodrik, D. (2016), “Premature deindustrialization,” *Journal of Economic Growth*, vol 21(1), pages 1–33.
22. ILO (2019), “Working on a Warmer Planet: The impact of heat stress on productivity and decent work.”
23. HM Government (2020), “The Ten Point Plan for a Green Industrial Revolution.”
24. Project Syndicate (2021), “Europe Must Become a Global Climate Power.”
25. GGGI (2019), Green Growth Index.
26. ILO(2015), “Green Equality and Green Jobs.”
27. Source for target commitments: Energy & Climate Intelligence Unit (2020), 2020 Scorecard; Source for emissions data (2018 values): IEA (2018), CO2 Emissions Statistics.
28. WEF (2020), “Jobs of Tomorrow Mapping Opportunity in the New Economy.”
29. This refers to the provision of care for people with short-term or with chronic illnesses and/or disabilities.
30. Probst, L. & Scharf, C. – PwC and WGS (2019), “The Lost Workforce.”
31. PwC (2020), “23rd Annual Global CEO Survey, Navigating the rising tide of uncertainty.”
32. OECD (2017), *Getting skills right: Skills for jobs indicators*.
33. Qualification mismatch analysis looks at the proportion of workers that are in occupations for which they are either under-qualified and the proportion of workers that are over-qualified
34. OECD (2020), *Skill needs dataset*.
35. Global Innovation Index (2020). All countries have 2020 data except for South Korea (2018), United Kingdom (2018), Japan (2017), UAE (2018), United States (2018) and the Netherlands (2018).
36. PwC (2020), “Upskilling: Building confidence in an uncertain world – Findings from PwC’s 23rd Annual Global CEO Survey.”
37. WEF (2012), “Addressing the 100 Million Youth Challenge— Perspectives on Youth Employment in the Arab World.”
38. WIPO (2020), Global Innovation Index (GII 2020); INSEAD (2020), Global Talent Competitiveness Index (GTCI 2020).
39. WEF & PwC (2021), “Upskilling for Shared Prosperity.”
40. Economists use human capital to explain country-level differences in macroeconomic growth and features of the labor market such as wage inequality, polarisation of earnings growth and occupational polarisation. See Acemoglu, D. and Autor, D. (2012), “What Does Human Capital Do? A Review of Goldin and Katz’s *The Race between Education and Technology*.”
41. Regmi, K. (2015), “Lifelong learning: Foundational models, underlying assumptions and critiques,” Springer Science+Business Media Dordrecht and UNESCO Institute for Lifelong Learning.
42. Hyde, M. & Phillipson, C. – University of Manchester, Foresight and UK Government Office for Science (2014), “How can lifelong learning, including continuous training within the labor market, be enabled and who will pay for this? Looking forward to 2025 and 2040 how might this

- evolve?”
43. Foresight & UK Government Office for Science (2017), “Future of Skills & Lifelong Learning.”
 44. European Commission (2020), “Education and Training 2020 – Improving Policy and Provision for Adult Learning in Europe.”
 45. Local Government Association (2020), “Learning for Life: the role of adult community education in developing thriving local communities – A handbook for councillors.”
 46. For example, one study found that a university degree is associated with an increase in lifetime earnings of over £230,000, and that the benefit to the government is even greater, resulting in a net present value of nearly £500,000; Foresight & UK Government Office for Science (2017), “Future of Skills & Lifelong Learning.”
 47. Cedefop (2017), “Investing in skills pays off: the economic and social cost of low-skilled adults in the EU.”
 48. OECD (2019), “OECD Skills Outlook 2019. Thriving in a Digital World.” OECD Publishing, Paris.
 49. UK Department for Education (2020), “Employer Skills Survey 2019.” Note: UK here excludes Scotland and refers to England, Northern Ireland and Wales; CIPD (2021), “Learning and skills at work survey 2021.”
 50. PwC (2021), “A leadership agenda to take on tomorrow, Findings from PwC’s 24th Annual Global CEO Survey.”
 51. Cross, K. P. (1982), *Adults as Learners: Increasing Participation And Facilitating Learning*, San Francisco (U.A.): Jossey-Bass.
 52. Smith, R., Egglestone, C., Jones, E., Aldridge, F. – Learning and Work Institute (2019), “Adult Participation in Learning Survey 2019.”
 53. PwC (2019), “Upskilling Hopes and Fears, PwC’s global survey on technology, jobs and skills.”
 54. Market failures explain why the market may fail to provide an efficient allocation of a good or service in terms of the underlying costs and benefits, and what is known about them.
 55. UK Social Mobility Commission (2019), “The adult skills gap: is falling investment in UK adults stalling social mobility?”
 56. WEF (2019), “Who should pay for workers to be reskilled?”
 57. Foresight and UK Government Office for Science (2014), “How can lifelong learning, including continuous training within the labor market, be enabled and who will pay for this? Looking forward to 2025 and 2040 how might this evolve?”
 58. Tindemans, B. & Dekocker, V. (2020), “The Learning Society, Centre of Expertise on Innovative Learning Pathways.”
 59. Brunello, G. & De Paola, M. (2004), “Market Failures and The Under – Provision Of Training.”
 60. European Commission, “The European Pillar of Social Rights in 20 principles.”
 61. Department of Education (2021), “Skills for Jobs: Lifelong Learning for Opportunity and Growth, Presented to Parliament by the Secretary of State for Education by Command of Her Majesty.”
 62. Foresight & UK Government Office for Science (2017), “Future of Skills & Lifelong Learning.”
 63. Orlik, J. & Kanders, K. – Nesta (2020), “Paving the way for better career journeys.”
 64. ILO (2015), “Global Employment Trends for Youth 2015.” MENA region retains highest youth unemployment rate in the world.
 65. Cheema (2017) explains how specific interventions for skills development are failing to look at the big picture of the enabling environment that supports job creation. See Cheema, A. (2017), “The Political Economy of Economic Empowerment: Bringing Politics and Society Back In, IDS Working Paper 484,” Brighton: IDS.
 66. Kristensen, P. H. (2016), “Constructing chains of enablers for alternative economic futures: Denmark as an example,” *Academy of Management Perspectives*, 30(2), 153–166.
 67. Hašič, I. & Johnstone, N. (2010), “Directing Technological Change while Reducing the Risk of (not) Picking Winners: The Case of Renewable Energy.”
 68. Industrial policies historically included measures such as targeted subsidies, concessional credit, privileged access to public procurement opportunities and trade protection. Arguments against industrial policy include its impact on competition and distorting economic activity by directing resources away from efficient sectors to less-efficient sectors.
 69. Mazzucato, M., Kattel, R. & Ryan-Collins, J. (2020), “Challenge-Driven Innovation Policy: Towards a New Policy Toolkit,” *J Ind Compet Trade* 20, 421–437.
 70. Acemoglu, D., Aghion, P., Bursztyn, L., and Hemous, D. (2012), “The Environment and Directed Technical Change,” *American Economic Review* 102(1): 131–66.
 71. Path-dependence is a phenomenon that arises when initial conditions and historical antecedents matter for eventual outcomes. See Young (1996).
 72. In this context, path dependence occurs where firms and scientists direct innovation towards what they are already good at. See Aghion, P. et al. (2015).
 73. Aghion, P., Boulanger, J., Cohen, E. (2011), “Rethinking industrial policy,” *Bruegel Policy Brief*.
 74. Rodrik, D. (2020), “Democratizing Innovation.”
 75. Gray, M. L. & Suri, S. (2019), *Ghost Work: How to Stop Silicon Valley from Building a New Global Underclass*, HMH Books 2019.
 76. As pointed out by the ILO, the policy that grows out of this increased interest in skills development as an important means of addressing economic, social and developmental concerns is usually called a National Policy (or Strategy or Plan) for Skills Development, TVET (technical and vocational education and training), HRD (human resources development) or Lifelong Learning. The policy is separate from, though often linked to, general education or labor policies. It focuses not only on young people who have completed their formal schooling, but also on adult workers, school drop-outs, workers in the informal economy and disadvantaged groups.

Endnotes

77. This paper is not intended to cover exhaustively all key policy areas to address environmental, economic and social sustainability. The ILO identified the following areas in addition to skills development policies: (i) Macroeconomic and growth policies; (ii) industrial and sectoral policies; (iii) enterprise policies; (iv) occupational safety and health; (v) social protection; (vi) active labor market policies; (vii) rights; (viii) social dialogue and tripartism.
78. Adopting these new attitudes to education is a critical starting point for governments wishing to achieve a more resilient labor markets, which can take the form of creating new government organisations focused on skills development. See PwC (2019), “The Lost Workforce.”
79. The upskilling journey is fraught with potential setbacks. Our analysis in Chapter 4 makes clear that behavioural and situational barriers, such as ageism and caring responsibilities, are one of the largest obstacles to upskilling. A vision for the skills economy must therefore be set in light of (not in spite of) the complex human factors that have held back the pace of upskilling.
80. Singapore has consistently been in the top 3 countries of the Global Talent Competitiveness Index because its holistic developmental approach connects the development of skills to their productive use in the right market and business environment.
81. Most governments are still struggling to fully comprehend the significant challenges brought on by changing demographics, technology and other megatrends: See European Commission (2019), “High-level conference: Skills for Industrial Strategy 2030.”
82. OECD (2020), “Leadership for a High Performing Public Service: Towards a Senior Civil Service Systems in OECD countries.”
83. OECD (2020). Nine case studies identified various common leadership capabilities despite a wide variation in topics and national contexts. These have been grouped into the aforementioned four capabilities.
84. One risk of combining the responsibilities over skills with the responsibilities for education is that educational targets can be prioritised at the expense of upskilling targets.
85. Encapsulated by its slogan of “Connect, Collect, Comprehend, Create,” the Smart Nation strategy covers public safety, transport, healthcare, education, enterprise, and energy (see GTCI, 2017.)
86. Aguirre, D. & Alpern, M. (2014), “10 principles of leading change management,” Strategy+Business.
87. This analysis uses some of the principles of agile governance as defined by the WEF. See WEF (2016), “A Call for Agile Governance Principles.”
88. International Labor Organization (2011), “Skills for Employment Policy Brief. Formulating A National Policy on Skills Development.”
89. The SkillsFuture initiative in Singapore, which supports the Smart Nation vision, uses business information to map the skills industries will need in the future. The government then provides financial credits to train citizens over 25 in these skills. The success of the initiative has been underpinned by “Tripartism” – the joint participation of government, employers and unions – to encourage second careers via lifelong learning.
90. Demos Helsinki (2015), “This is why Finland is able to implement the basic income experiment.”
91. Ministry of Economic Affairs and Employment & Experimental Finland (2020), “Local government pilots on employment combine state and municipal resources to boost employment – Pilots to start in March 2021. Experimental Finland.”
92. Deliberative processes involve a component of broader stakeholder participation, the most common being online calls for submissions (used in 33 cases) and surveys (29 cases). Other methods are public consultations (19 cases) and roundtable discussions (16 cases). The combination needs to be sequenced so it is clear how the outputs of participatory processes feed into citizen deliberations. See OECD (2020) Innovative Citizen Participation and New Democratic Institutions: Catching the Deliberative Wave.
93. OECD (2020), “Innovative Citizen Participation and New Democratic Institutions: Catching the Deliberative Wave.”
94. Etzkowitz, H. & Leydesdorff, L. (1995), The Triple Helix--University-Industry-Government Relations: A Laboratory For Knowledge Based Economic Development, University of Amsterdam.
95. International Labor Organization, “Addressing rising demand for digital skills to be delivered through apprenticeships.”
96. UK Education & Skills Funding Agency (2021), “ESFA Update further education: 20 January 2021.”
97. Decarbonisation goals can have adverse impacts on certain jobs, so the timing of the transition needs to be managed accordingly to allow affected workers to move to new jobs or sectors. Some business leaders worry about the transition being too fast. For instances, Larry Fink, the CEO of asset management group BlackRock argued that a rapid shift away from fossil fuels would risk “extraordinary” UK job losses. See BBC News (2021), “Stampede from fossil fuels ‘would cost UK jobs’”
98. International Labor Organization (2011), “Skills for Employment Policy Brief. Box 2. Ireland: Improved matching of skills demand and supply through policy coordination and shared responsibilities.”
99. OECD (2019), “OECD Skills Strategy 2019 - Chapter 4. Developing relevant skills over the life course. Country practices: Setting the national vision for skills and lifelong learning.”
100. Norwegian Committee on Skills Needs (2018), “Mandate of Official Norwegian Committee on Skill Needs.”
101. Ministry of Skill Development and Entrepreneurship data.
102. International Labor Organization data.
103. National Skill Development Council; Sector Skill Councils.
104. Sanghi, S. (2012), “Skills Development by Green and Inclusive SMEs in India: Entrepreneurs’ Approaches.”
105. Low residential mobility may pose another barrier to the efficient reallocation of labor. Indeed, policy interventions in housing markets, such as transaction costs or rental market

regulations, have been shown to be important for residential mobility, which raises the possibility that they may also be relevant for mismatch. [derived from McGowan and Andrews 2015].

106. Bratti M., Conti M., Sulis G. (2021), "Employment protection and firm-provided training in dual labour markets," *Labour Economics*, Volume 69.
107. Remarks by Angel Gurría, OECD Secretary-General, delivered at the Joint Vienna Institute, July 2011. See Gurria, A. - OECD (2011), "Skills for the 21 century: from lifetime employment to lifetime employability."
108. The term was first coined by David Finegold. Finegold, D. (1999), "Creating self-sustaining, high-skill ecosystems," *Oxford Review of Economic Policy*, Volume 15, Issue 1, Pages 60-81.
109. Nordreigo (2019), "Skills Policies - Building Capacities for Innovative and Resilient Nordic Regions. Case study: Regional examples from Denmark."
110. Einiö, E. & Overman, H. (2016), "Effectiveness of place-based policies: UK evidence."
111. West Midlands Combined Authority (2019), "Mayor launches 'Beat the Bots' fund."



WORLD GOVERNMENT SUMMIT



@WorldGovSummit



#WorldGovSummit

Join the conversation
worldgovernmentsummit.org