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Preparing for the future of work:
National policy responses in ASEAN +6

ANNEX I
Labour markets and technological change

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Australia

I. Does the country have a specific strategy or plan for advancing on technology-driven growth, including Industry 4.0?

In December 2018, the Australian Government launched its **Digital Economy Strategy** entitled **"Australia's Tech Future: Delivering a strong, safe and inclusive digital economy"**.[1] The Strategy was produced by the Government's Department of Industry, Innovation and Science following a public consultation process initiated in September 2017, where the public was invited to make submissions through an online web page. The Strategy is governed by the vision that "Australians enjoy an enhanced quality of life and share in the opportunities of a growing, globally competitive modern economy, enabled by technology". It is organized around four broad key areas, namely people, services, digital assets and the enabling environment. Within each of these key areas, there are several sub-themes discussed in more detail, namely skills, inclusion, digital government, digital infrastructure, data, cyber security, and regulation. For each of the sub-themes, the Strategy includes a description of its respective relevance, what the opportunities are, what areas policies need to focus on, and what policies are being implemented by the Government.

The Digital Economy Strategy also includes a brief description of its implementation, referring to the responsibilities of governments, business and individuals. In particular, the Government envisages maintaining the collaboration with industry, community groups and academia that was built up during the public consultation process. It also aims to work closely with the governments of states and territories and plans to engage in performance monitoring.

While Australia has its Digital Economy Strategy, it does not have an explicit Industry 4.0 strategy. Nevertheless, a number of initiatives have been put in place with the objective of creating a business-friendly and innovative environment that embraces new technologies.[2] In April 2016, the Government announced the formation of an **Industry 4.0 Taskforce**. This Taskforce was composed of business leaders and academics and it pursued as one of its initial tasks, cooperation between Australian and German industry leaders for collaboration on Industry 4.0.

The Taskforce was succeeded in August 2018 by an **Industry 4.0 Advanced Manufacturing Forum** hosted by the Australian Industry Group, an employer association that covers a wide range of industries. The Forum works on reference architectures, standards and norms; research and innovation; security of networked systems; and test laboratories and the future of work, education and training.

As one of the outcomes of the Prime Minister's Industry 4.0 Taskforce, an agreement on German-Australian cooperation on Industry 4.0 was concluded.[3] The agreement defines five areas of cooperation, including reference architectures, standards and norms; support for small and medium scale enterprises (SMEs); Industrie 4.0 Testlabs; security of networked systems; and work, education and training.

Another initiative is the **Industry 4.0 Testlabs pilot programme**, which builds on the recommendations of an "Industry 4.0 Testlabs in Australia" report, released by the Prime Minister's Industry 4.0 Taskforce. The objectives of the programme (5 million Australian dollars), which started in September 2018, are to provide a physical space for businesses and researchers to trial, explore and showcase Industry 4.0 technologies and processes; to enable educational institutions and industry, particularly SMEs, to collaborate; and to develop skills needed to take full advantage of the opportunities presented by Industry 4.0.

1 Ministry for Industry, Science and Technology, Australian Government: *Australia's tech future: Delivering a strong, safe and inclusive digital economy,* 2018. See also, website: https://www.industry.gov.au/data-and-publications/australias-tech-future [accessed 13 June 2019].

2 Department of Industry, Innovation and Science, Government of Australia: "Industry 4.0", website: https://www.industry.gov.au/funding-and-incentives/manufacturing/industry-40.

3 Platform Industrie 4.0: "German-Australian cooperation on Industrie 4.0 agreed", News release, 5 May 2017.

There is also the industry-led **Growth Centres Initiative**,[4] aiming to drive innovation, productivity and competitiveness in priority sectors, namely manufacturing; cyber security; food and agribusiness; medical technologies and pharmaceuticals; mining equipment, technology and services; and oil, gas and energy resources. The Growth Centres are not-for-profit organizations led by industry experts and aimed at increasing collaboration and commercialization, improving international opportunities and market access, enhancing management and workforce skills, and identifying opportunities for regulatory reform. The Growth Centres have engaged with more than 25,000 organizations and firms.

The Australian **Industry 4.0 Higher Apprenticeship Programme**, funded through the Skilling Australians Fund and led by the Australian Industry Group, also covers topics such as advanced manufacturing processes, automation and robotics, the Internet of Things and cloud computing. This Programme is equally committed to investing in science and technology, including advanced technologies such as satellite imagery and artificial intelligence. There are also initiatives that support Australian businesses and workers to develop artificial intelligence and machine learning capabilities, and the Australian Council of Learned Academies is examining the opportunities, risks and benefits of artificial intelligence applications.

II. How does the strategy link to broader strategies/plans for industrialization and economic restructuring?

Australia's long-term plan on innovation is "**Australia 2030: Prosperity through innovation**", published in November 2017.[5] There is no direct and explicit mention of Australia's Digital Economy Strategy or Australia's activities on Industry 4.0 within this long-term innovation plan or a reference vice-versa. However, content-wise the strategies closely align with each other. One of the five imperatives for action in Australia 2030 is "Industry: Ensure Australia's ongoing prosperity by stimulating high-growth firms and improving productivity". This imperative outlines the need to strengthen the country's digital economy. It also puts emphasis on supporting young, high-growth, exporting firms and improving access to global talent pools, fostering greater gender and ethnic diversity.

III. How does the country seek to prepare the labour market for the Fourth Industrial Revolution (4IR)?

In December 2015, the Government initiated the National Innovation and Science Agenda and committed 1.1 billion Australian dollars over four years to 24 measures to complement the Government's focus on science, research and innovation as long-term drivers of economic prosperity, jobs and growth. The four pillars of the Agenda include: (i) backing Australian entrepreneurs by opening up new sources of finance and supporting risk; (ii) increasing collaboration between industry and researchers to find solutions to real world problems and to create jobs and growth; (iii) developing and attracting world-class talent for the jobs of the future; and iv) leading by example in the means of embracing innovation and agility. One of the initiatives supported by the National Innovation and Science Agenda is the Commonwealth Scientific and Industrial Research Organisation's (CSIRO) Data61, formed in 2016 to lead on the topic of data innovation. Among numerous other activities, the group is currently developing the national Artificial Intelligence Ethics Framework.[6]

Skills development is included as an area of action in the Digital Economy Strategy and in the various Industry 4.0 initiatives such as the Industry 4.0 Testlabs pilot programme and the Growth Centres Initiative. Skills development also figures prominently in the Australia 2030: Prosperity through innovation plan.

The Digital Economy Strategy summarizes the Government's work linked to skills as: (i) delivering futurefocused, flexible and responsive education and training systems;

4 Department of Industry, Innovation and Science, Australian Government: "Industry Growth Centres", website: https://www.industry.gov.au/strategies-for-the-future/industry-growth-centres.

5 Innovation and Science Australia: *Australia 2030 Prosperity through innovation: A plan for Australia to thrive in the global innovation race* (Canberra, Australian Government, 2018).

6 D. Dawson et al: *Artificial Intelligence: Australia's Ethics Framework* (Commonwealth Scientific and Industrial Research Organisation, 2019). Public consultation on the discussion paper ended on 31 May 2019.

(ii) supporting reskilling and transitioning workers; (iii) supporting Australian regions; (iv) supporting lifelong learning; (v) encouraging small business to embrace digital technology; and (vi) accelerating and coordinating efforts to address priorities.

Skilled migration is also mentioned and described as an "important way of attracting highly-skilled people who can help grow new opportunities and address short-term gaps". It is recognized that the visa system needs to be supportive for Australia to compete for skilled workers globally in fields where suitably skilled Australians are not available. In addition, skilled migration is also seen as a source to transfer skills to Australian nationals.

The Industry 4.0 Testlabs pilot programme and the Growth Centres Initiative include elements related to skills policies. The former aims to enable educational institutions and industry, particularly SMEs, to collaborate and develop the skills needed to take full advantage of opportunities presented by Industry 4.0. The latter focuses, amongst others, on management and workforce skills. The Industry 4.0 Higher Apprenticeship Programme also aims to build up professional skills in relation to Industry 4.0.

The Australia 2030: Prosperity through innovation plan includes policy actions on "Education: Respond to the changing nature of work by equipping all Australians with skills relevant to 2030". This strives to transform Australia into an innovative and fair country by 2030. The plan refers to the improvement in the teaching of science, technology, engineering and maths (STEM) skills as well as increased responsiveness of the technical and vocational education and training (TVET) system to new priorities presented by innovation. Reference is also explicitly made to digital skills.

Related to inclusion, the Digital Economy Strategy lists five areas of focus: (i) The ongoing affordability of access to digital services is to be ensured; (ii) The Government aims to have an increasing rural participation in terms of access and affordability of broadband services; (iii) Older members of society are to be supported in becoming digitally literate; (iv) The strategy aims to reduce the gender gap between men's and women's use of the internet, the former being higher than the latter; and (v) The strategy aims to protect human rights, democracy and peace online. Among the Government's policy measures listed as aiding the objective of inclusion is its programme to expand the National Innovation and Science Agenda's "Women in STEM" package.

IV. How does the government foresee protecting workers who are potentially affected by technological disruption?

The Digital Economy Strategy mentions that workers can be adversely impacted by automation. In reaction, the Strategy suggests supporting those workers to upskill, reskill or transition to new jobs, the support to be provided by the Government and industry. The Government thus foresees protecting workers affected by technological disruption mainly through skills policies, helping them to adjust their skills sets to the skills demanded by the labour market.

Moreover, Australia has an unemployment benefits system in place called **Newstart Allowance**. The system is not explicitly mentioned in the Digital Economy Strategy or the Industry 4.0 policies but it provides support to any worker who is unemployed regardless of the reason for unemployment. To obtain benefits, workers need to be an Australian resident, above the age of 22 and below the pension age, unemployed with income or assets below a certain amount, and proved to be looking for work and not on strike.

Are labour standards addressed in relation to planning for Industry 4.0 and/or economic restructuring plans?

Labour standards are not explicitly addressed in relation to planning for new technological developments.

How is the country approaching the issue of digital labour platforms?

The approach towards digital business platforms is currently being debated in Australia. With regards to employment relationships, there was a court case brought to the Fairwork Commission in relation to

an unfair dismissal claim of an Uber driver.[7] In order to establish standing to bring the claim, the driver had to be an employee, as opposed to an independent contractor. In January 2018, the Fairwork Commission ruled against the Uber driver. According to the Commission, Uber drivers are not employees, implying that they are not subject to dismissal rules.[8]

With regards to tax policies, the Treasury of the Australian Government is currently exploring options to address the challenges to the Australian tax system arising from digitalization. In October 2018, it opened a public consultation process. One input into this process was a discussion paper[9] that discusses the challenge of corporate taxation in the digital age and explores longer-term solutions as well as short-term options. Submissions to the consultation process were accepted up to November 2018.

In July 2017, Australia introduced a goods and services tax on digital services and products supplied to Australians from overseas companies. The tax is commonly being referred to as the "Netflix tax". The tax is a flat rate of 10 per cent on the value and its proceeds are shared between states and territories.[10]

V. What are the roles of social partners and the private sector in the strategies or policies specific to technological developments?

The Digital Economy Strategy "Australia's Tech Future" was designed by the Australian Government and underpinned by a public consultation. On the basis of the submissions that were agreed to be published by the submitter there were no inputs from trade unions but various inputs from business. The description of how the Strategy is going to be implemented mentions the responsibilities of governments, business and individuals, with a focus on the collaboration between the Government and industry, community groups and academia. There is no explicit mention of trade unions.

Similarly, for the Industry 4.0 initiatives, the Industry 4.0 Taskforce was composed of business leaders and academics. The Industry 4.0 Advanced Manufacturing Forum that succeeded this taskforce is hosted by the Australian Industry Group, an employer association that covers a wide range of industries. There is no involvement of trade unions.

7 The Fairwork Commission is Australia's workplace relations tribunal, established by the Fair Work Act 2009 and responsible for administering the provisions of this Act.
8 D. Marin-Guzman: "Uber wins Fair Work Commission case over drivers' employment rights", in *Financial Review*, 5 January 2018.
9 The Treasury of the Australian Government: *The digital economy and Australia's corporate tax system*, Treasury Discussion Paper, 2018.
10 "Netflix tax' to come into effect this week", in *The New Daily*, 25 June 2017.

Brunei Darussalam

I. Does the country have a specific strategy or plan for advancing on technology-driven growth, including Industry 4.0?

Brunei Darussalam does not have a stand-alone document on Industry 4.0.

II. How does the strategy link to broader strategies/plans for industrialization and economic restructuring?

The economic strategy set out in the country's long-term development plan, **Brunei Vision 2035 (Wawasan Brunei 2035)**, was first published in 2007. The principal aims of the Vision are to have Brunei recognized for the accomplishments of its highly skilled population and to achieve a quality of life and income per capita that are among the highest in the world. The Vision aims to expand both the oil and gas downstream sectors and economic clusters outside of the oil and gas sector, i.e. to maximize the economic spin-offs from the energy industry. Local business development is also seen as a major part of the plan, with particular focus given to boosting opportunities for SMEs.

The **Digital Government Strategy 2015–2020** was released in 2015 as one mechanism for moving towards the Wawasan Brunei 2035 goals. The aim of the Strategy is to embrace information technology in order to "enable the seamless flow of information across the Government, citizens and businesses leading to greater transparency and better insights for informed decision making".[11] The Strategy includes programmes to: (i) advance digital government services; (ii) increase transparency with unique digital identifiers for citizens and businesses; (iii) improve communication between the Government and stakeholders; and (iv) improve labour market information for better job matching.

III. How does the country seek to prepare the labour market for the Fourth Industrial Revolution (4IR)?

The modernization objectives of Brunei Darussalam's education and training system are not directly aligned to a 4IR strategy but rather to the broader vision of development invoked in the Wawasan Brunei 2035 document. The development planning documents do not go into detail on skills development, but other government documents do focus specifically on the measures to be taken to raise national education standards, although these are already quite dated. The **National Education System for the 21st Century**, revised in 2013, aims to "meet the changing needs of a forward-looking economy" by adopting best practices in teaching and learning, strengthening information and communications technology (ICT) competencies, devising programmes that promote lifelong learning and investing in research and development (R&D) and innovation in government-funded institutions and through public-private and international partnerships. The document takes note of the shortage of local teachers, which is to be offset, in part, by the recruitment of foreign teachers while strengthening teacher training facilities for nationals.

An unstated objective of long-term planning in Brunei Darussalam is to ease the dependence on foreign workers. Yet understanding the challenges of finding national workers to take up low-skilled jobs, the Ministry of Home Affairs through the Labour Department initiated a policy in 2017 to shorten the processing period for employing foreign workers, even while reminding employers to comply with the predetermined ratio of local to foreign workers.[12]

11 Government of Brunei Darussalam: "Digital Government Strategy 2015–2020, Brunei Darussalam", web portal. Available at: https://social.shorthand.com/GOV_BN/3CY28wtWq/digital-government-str [accessed 18 February 2019].

12 "Labour Dept announce new process for foreign workers employment", in *BruDirect.com*, 28 September 2016.

IV. How does the government foresee protecting workers who are potentially affected by technological disruption?

The development planning documents do not discuss the potential of job disruption due to industrial restructuring. The Department of Labour maintains the responsibility for overseeing the list of licensed employment agencies for recruitment of foreign workers, categorized by employer group (households for domestic workers, companies). It is also responsible for ensuring compliance with the Employment Order 2009 and the Workplace Safety and Health Order, 2009. No mention is found regarding other labour market policies.

Are labour standards addressed in relation to planning for Industry 4.0 and/or economic restructuring plans?

Labour standards are not explicitly addressed in relation to planning for new technological developments.

How is the country approaching the issue of digital business platforms?

Brunei Darussalam opened itself up to the ride-hailing industry in March 2018, when the company Dart was granted permission by the Ministry of Communications to operate on a provisional permit. Given the small size of the country and its working population and its advanced income status, digital labour platforms do not occupy much space in the local job market, although there is evidence of a handful of Brunei Darussalam nationals signing themselves up for crowdwork on various international platforms like Upwork.

V. What are the roles of social partners and the private sector in the strategies or policies specific to technological developments?

Information about the role of social partners in the formulation process of policies or strategies is lacking. However, there are 20 ministries or institutes listed in the document's acknowledgments, implying that some dialogues took place. Trade unions or employers' organizations are not mentioned.

Cambodia

I. Does the country have a specific strategy or plan for advancing on technology-driven growth, including Industry 4.0?

Cambodia does not have a specific strategy or policy document that lays down how the country plans to respond and adapt to technology-driven industrial development. However, **Cambodia's National Science and Technology Master Plan (CNSTMP) 2014–2020** and the **Cambodian ICT Masterplan (CIM) 2020** provide a broad understanding of how the country seeks to build up national capability in the science and technology (S&T) domain – including in ICT. The major focus of these documents is on developing human resource capabilities, expanding and enhancing S&T and ICT infrastructure, promoting R&D, employing tech-driven production processes and services in various sectors to boost productivity, and developing technological know-how among the general population.

II. How does the strategy link to broader strategies/plans for industrialization and economic restructuring?

The development of technological prowess features prominently in Cambodia's national planning documents. The Government's **Rectangular Strategy for Growth, Employment, Equity and Efficiency: Building the foundation toward realizing the Cambodia vision, Phase IV** (RSP4), released in September 2018, identifies the "preparation for digital economy and Fourth Industrial Revolution" as one of the keys to economic diversification, and the "strengthening of the quality of education, science and technology" as pivotal to overall human resource development to support Cambodia's ambition to graduate into upper-middle-income country status by 2030 and a high-income country by

2050.[13] The **National Strategic Development Plan 2014–2018** likewise placed an important emphasis on the development of ICT and S&T for the development of the country, and the updated document for the 2019–2023 period is expected to follow the RSP4 in defining the Government's priorities and policies on preparing to adapt and respond to the 4IR.

III. How does the country seek to prepare the labour market for the Fourth Industrial Revolution (4IR)?

Two important points highlighted by the RSP4 in relation to preparing the country for the digital economy and the 4IR that link most closely to the labour market are enhancing the education system with a focus on digital technology, including training programmes, and fostering entrepreneurship while creating a conducive environment for the digital ecosystem to flourish.

One "rectangle"– i.e. priority area – of the Rectangular Strategy, Phase IV, is human resource development, which entails: (i) improving the quality of education and S&T; (ii) vocational training; (iii) improving public health care and nutrition; and (iv) strengthening gender equality and social protection. The Strategy acknowledges the country's challenges in terms of learning outcomes. To encourage improvements, the Government is pledging to increase the salaries of teachers and education staff in accordance with their performance, enhance teacher training and take other actions to strengthen learning institutions. Regarding technical training, the stated strategic goal is to have each young person specialize in at least one life skill. The Government aims to implement the National Policy Framework on Technical and Vocational Training 2017–2025, the Cambodia Qualification Framework and the National Competency Standards and Competency-based Curriculum to this effect.

The sector specific policies, i.e. CNSTMP and CIM, also both emphasize the need for demand-based human resource development in the S&T and ICT sectors. The CNSTMP stresses the need to develop S&T human resources for core sectors such as agriculture, energy, manufacturing, health and green growth while the CIM highlights the importance of standardizing the type and level of ICT skills and implementing a nationwide certification programme. Both documents also highlight the importance of equipping educational and training institutions with the necessary infrastructure and human resource support, including training instructors, in order to create a strong foundation for technology-based education. Additionally, the CIM underscores the need to link university curricula to the demand from Cambodia's ICT industry.

Promoting access to technology and technological manpower for SMEs – which employ a large section of the Cambodian workforce – through a "mandatory retraining system for technical manpower of SMEs" and providing low-interest loans to SMEs for R&D purposes with a view to enhancing their competitiveness and technological capabilities are important policy priorities under the CNSTMP.[14] The Government is expected to play a key role in promoting R&D in technology related fields with a target of increasing government expenditure on R&D to 1 per cent of GDP by 2020 while simultaneously working towards augmenting the efficiency of R&D centres in the country, as well as supporting and incentivizing the private sector to invest in R&D and technological development.

Furthermore, the Cambodian Government seeks to attract foreign capital in S&T fields by extending tariff and tax-related incentives. Transfer of technology and skills from foreign companies is anticipated to contribute towards advancing indigenous technological developments. Business development in the S&T and ICT sectors, including through potential collaborations between public and private entities, is an important priority highlighted in both the CNSTMP and CIM.

With a view to preparing the population to adequately adapt to and adopt technological developments, the Government has also prioritized the creation of opportunities to access ICT and the promotion of digital literacy for all.

13 Government of Cambodia: *Rectangular Strategy for Growth, Employment, Equity, and Efficiency: Building the foundation towards realizing the Cambodia vision 2050 phase IV of the Royal Government of Cambodia of the sixth legislature of the national assembly*, 2018.

14 Government of Cambodia: *Cambodia's National Science and Technology Master Plan (2014–2020)*, 2013.

IV. How does the government foresee protecting workers who are potentially affected by technological disruption?

While broadly laying down the Government's priorities vis-à-vis preparation for the 4IR, the RSP4 document highlights that technology-driven changes in the industrial ecosystem bring both opportunities and challenges. The document states that the Government "has to manage the adverse effects caused by the industrial revolution that include changing style of doing business and job losses, political and social instability and the cyber-attacks etc."[15] However, specific actions as to how the Government prepares to protect workers that are potentially affected by technological disruptions have not been discussed. Moreover, on the social protection front, there are no unemployment benefit programmes run by the Government and anchored in Cambodia's national legislation.

Are labour standards addressed in relation to planning for Industry 4.0 and/or economic restructuring plans?

Labour standards are not explicitly addressed in relation to planning for new technological developments.

How is the country approaching the issue of digital labour platforms?

Our review was not able to find specific regulations or policy planning with regards to the governance of digital labour platform-based businesses and employment relations in such businesses. With regards to ride-hailing apps, however, it is reported that the Government has issued regulations requiring all ride-hailing apps to register with the Ministry of Public Works and Transport to continue operation.[16] The regulation, it is reported, also opens up avenues for taxi drivers employed by local taxi companies to simultaneously work as private contractors for ride-hailing platforms without violating their existing contract.

V. What are the roles of social partners and the private sector in the strategies or policies specific to technological developments?

The CNSTMP and CIM both outline the important role of the private sector in technology-driven growth of the Cambodian economy, although no mention is made regarding the role of workers' and employers' organizations. Tapping into private sector investments for R&D through the employment of incentive mechanisms as well as exploring vistas for collaboration between the private and public sectors to drive ICT development forward are prioritized. Furthermore, the Government also seeks to cooperate with community-based organizations like schools, social welfare centres and religious organizations in order to promote digital literacy. Broadly, it seeks to create a nexus between the Government, the private sector and academia to drive Cambodia towards tech-driven growth in multiple sectors of the economy.

15 Government of Cambodia: *Rectangular Strategy for Growth,* op cit.
16 R. Spiess and K. Kotoski: "Local ride-hailing apps tripped up by crackdown on tuk-tuks" in *The Phnom Penh Post*, 14 November 2017.

China

I. Does the country have a specific strategy or plan for advancing on technology-driven growth, including Industry 4.0?

The State Council announced the **Made in China 2025** industrial plan in May 2015 with the action plan following in December. The overarching objective of the plan is to transform the country into an advanced manufacturing power by targeting 10 strategic sectors, including artificial intelligence and robotics.[17] The goal is to strengthen the domestic supply chain, in part through generous state support to industries like robotics, industrial software development and digitized machine tools. Ultimately, the aim is to increase the Chinese-domestic content of core materials to 40 per cent by 2020 and 70 per cent by 2025 and to foster a fast technological catch-up to countries such as Germany and the United States. The most substantial tool to put the plan into action is the financial support offered to key initiatives, whereby state-owned banks distribute subsidies and offer low-interest loans and bonds, especially to SMEs.

Discussion of the **Made in China 2025** plan have been somewhat downplayed recently as tensions with the United States over trade issues flared up in 2018, but government actions to support tech start-ups, invest in R&D and advance the country's position as a leader in the 4IR continue.[18] The plan makes clear that China is seeking to be a global leader not just in manufacturing, but rather in "service-oriented manufacturing". Mention is also made to the development of specific guidelines for implementation of a service-oriented manufacturing plan.

II. How does the strategy link to broader strategies/plans for industrialization and economic restructuring?

Beyond the Made in China 2025 plan, there are numerous other planning documents that link to the promotion of technological development as the driver of economic growth in the future. Among these are the **Plan for the Development of the Robotics Industry 2016–2020** (released in April 2016), **Guideline for the Special Programme for Developing a Service-Oriented Manufacturing** (released in July 2016), **Development Plan for Innovation Capacity in Industrial Technology** (released in October 2016), the **Smart Manufacturing Development Plan 2016–2020** (released in December 2016) and the **Internet Plus** strategy (released in March 2015).[19] The latter document sets out the plan to bring digitalization to all aspects of public services and economic activity across all sectors. The Government in 2017 also issued an **Action Plan for Promoting Development of a New Generation Artificial Intelligence Industry 2018–2020,** which is expected to expedite artificial intelligence industry development through artificial intelligence R&D, product application and industrial cultivation and contribute to reaching the objectives of the Made in China 2025 strategy.[20]

The **13th Five-year Plan for Economic and Social Development 2016–2020**[21] laid the foundation for the Made in China 2025 plan. Its key objective is to promote the shift from capital accumulation-led growth to innovation-led growth, thus setting the stage for the industrial plan that followed. Also relevant are the Plan's call for modernization of agriculture and the promotion of a digitized economy.

17 The full list of the ten key sectors is: next-generation information technology, numerical control tools and robotics, aerospace equipment, ocean engineering equipment and high-tech ships, railway equipment, energy saving and new energy vehicles, new materials, biomedicine and medical devices, agricultural machinery, and power equipment.

18 C. Liu: "Chinese tech startups confident Made in China 2025 plan will carry on", in *Nikkei Asian Review*, 14 January 2019.

19 ESCAP (2019) makes reference to numerous additional "frontier technology-related policies and policy objectives" in the country that are delineated by specific outcome areas, e.g. on connected industries. For a more detailed picture see ESCAP: *Evolution of science, technology and innovation policies for sustainable development: The experiences of China, Japan, the Republic of Korea and Singapore* (Bangkok, 2019).

20 P. Triolo, E. Kania and G. Webster: *Translation: Chinese government outlines AI ambitions through 2020* (Japan Advanced Institute of Science and Technology, 2018).

21 National Development and Reform Commission, Government of China: *13th Five-year Plan for Economic and Social Development (2016–2020)*, 2016. Available at: http://en.ndrc.gov.cn/policyrelease/ [accessed 17 June 2019].

III. How does the country seek to prepare the labour market for the Fourth Industrial Revolution (4IR)?

Unlike some of the other industrial strategies that we have seen, China's plan is explicit about the role of the labour market as a key element of the projected transformation. Yet in terms of actions to be taken for "talent-oriented development" to support high-tech growth, the approach adheres closely to the supply-side approach for skills development seen in most other countries.

The specific steps to be taken for "multi-level cultivation systems" include:

- Strengthen overall planning and classified guidance on manufacturing talent development and implement manufacturing talent cultivation plan.
- Strengthen efforts to cultivate professional, technical, managerial and administrative personnel and perfect related talent development systems.
- Focus on improving modern operations by implementing the Quality Promotion Project for enterprise operations and management personnel and the Yin He Training Project to help SMEs cultivate entrepreneurs and high-level managerial personnel.
- Focus on high-level and high-demand professional and technical personnel by implementing the Knowledge Personnel Improvement Project.
- Increase the number of advanced manufacturing engineers by building engineering and innovation training centres in universities.
- Strengthen vocational education and skills training by enabling undergraduate universities to transform into applied technology universities and by building training bases to carry out modern apprenticeship pilot demonstrations.
- Encourage cooperation between enterprises and schools to cultivate researchers, technicians and inter-disciplinary professionals needed by manufacturing.
- Increase enrolment numbers and quality of engineering doctorates and professional degrees to promote education combining production and research.
- Strengthen industrial personnel demand forecasting and personnel databases and build industrial talent assessment systems and information distribution platforms.
- Set up the talent incentive mechanisms project and increase recognition and rewards for excellent talent.
- Build and perfect manufacturing personnel service institutions and improve mechanisms for regulating the transfer of personnel between companies.
- Select talented young professionals and students, especially those with a professional and technical background, to go abroad for study and training, while building international training bases in China.

China seems determined to overcome the skills shortage that is likely to hamper industrial upgrading. The talent incentive mechanisms project (mentioned above) is an initiative to generate highly skilled talent. This seems to relate to the **National High-skilled Talents Revitalization Plan** (the original was published in 2011, with notification on deepening in 2016). This plan comes under the Ministry of Human Resources and Social Security and the Ministry of Finance and encapsulates "projects" that should ultimately serve to build the talent base called for in the Made in China strategy. There are three primary action areas in the plan: (i) training of master trainers; (ii) constructing top-notch training facilities; and (iii) organizing province-determined training programmes based on localized labour shortages. In 2019, the State Council pledged further action in its aim to upgrade vocational skills with the decision to spend an additional 100 billion yuan to that purpose, taking funds from the balance of the unemployment insurance fund.[22] While it is not clear what specific sectors are to be targeted, the national commitment to target skilling as one mechanism to expand employment opportunities is clear.

22 The State Council of the Republic of China: "China to upskill workforce to expand employment", News release, 1 May 2019.

The Ministry of Education in April 2018 issued the **AI Innovation Action Plan for Colleges and Universities** which, it is reported, directs Chinese universities to promote artificial intelligence by improving know-how in basic artificial intelligence theory, strengthening technology research and reaching technological breakthrough.[23] In doing so, it also sets a number of time-bound targets in relation to advancing Chinese educational institutions' global artificial intelligence competitiveness. Earlier in April 2018, China also launched a five-year Artificial Intelligence Training Programme aimed at training 500 instructors and 5,000 students over the period.[24] The programme is expected to invite experts on artificial intelligence to train an initial batch of instructors and students and is aimed at fostering home-grown talent in this field. Crucial importance is given to developing a national AI talent pool from an early age, including through the planned introduction of textbooks and courses on AI targeted to students even at the primary level.[25]

The other planning document that focuses on implementing a more open talent policy is the **Five-year Plan for Human Resources and Social Security Development 2016–2020**. The Plan calls for an accelerated formulation of regulations for foreign workers, including an easing of regulations for skilled foreign workers to obtain permanent residency. In March 2018, Beijing Municipality announced a full-scale recruitment initiative for skilled workers in S&T, the creative arts and financial management.[26] To encourage enterprises to hire talented foreign workers, China will offer recruitment subsidies and ease entry procedures. Subsidies can cover from 50 to 80 per cent of salaries. To attract national talent from universities and other institutions, numerous generous incentives are provided. Finally, large amounts of municipal funds are being put aside to reward innovation teams that succeed in contributions to high-end industrial development, including profit-sharing of enterprise revenues generated from their R&D efforts.

In 2010, China put forth its **National Plan for Medium and Long-term Education Reform and Development 2010–2020**, which pledged to increase fiscal expenditure on education to at least 4 per cent of GDP, introduce universal early education, improve the quality of education and push higher education gross enrolment rates to 40 per cent.

Regarding vocational education, the reform of the system was announced in February 2019 with a pledge of sizable funds made as mentioned earlier. The reform encourages all sectors of society, including major companies, to run vocational schools. The hope is that in five to ten years, the mostly government-run system will diversify to operate through more non-public entities, although careful attention should be made on ensuring quality standards. Currently, the education system and Chinese universities struggle to provide sufficient numbers of skilled workers for the sophisticated tasks in the high-tech industry. Hence the urgency given to the recent skills development programmes in the country.

IV. How does the government foresee protecting workers who are potentially affected by technological disruption?

Neither the Made in China 2025 document nor other planning documents reviewed make direct mention of the possibility of what could be painful adjustments to the current trade tensions and/or the shifting patterns of production. However, the documents hint at such, and in practice, the Government is setting funds aside to help laid-off workers find new jobs. While such measures at present are targeted at those workers laid off as a result of industrial restructuring policies and not yet in response to direct technological disruption, the national policy reactions provide a precedent for the future.

The Made in China plan aims to "pursue structural adjustment" and to "transform production-oriented manufacturing into service-oriented manufacturing", which, if one reads between the lines, implies that the traditional

23 N. Lung: "China's ministry of education issues action plan on promoting AI in universities", OpenGov, 17 April 2018.
24 "China launches first university program to train intl AI talents" in *China Daily*, 4 April 2018.
25 "China attempts to introduce AI courses in Chinese education", CGTN, 4 May 2018; C. Yang: "AI education in China starts young", CXLive, 20 November 2018.
26 "Beijing ramps up talent recruitment incentives, streamlines processes", China.org.cn, 23 March 2018.

labour-intensive manufacturing enterprises are going to feel the crunch. There are some signs that this is already happening, although it is not yet clear on direct causality to the Government's withdrawal of support from lower value-added manufacturing.[27] Numerous factory closures are also promoted in the name of environmental reform with increasingly stringent enforcement of pollution controls (see section on climate change).

The Government's strategy would seem to cover three aims at once: one, shifting the economy to an advanced manufacturing status; two, reducing production of oversized, inefficient industrial sectors; and three, contributing to efforts for environmental sustainability. While the "pain" of such adjustments is not mentioned, the rationale is clearly that the ultimate gains will outweigh the hardships. Factory closures and disruptions are resulting in lay-offs, but many of the laid-off workers have benefitted from the plethora of new job opportunities, particularly in the service sector.[28] Unemployment does not last long. More recently, though, it appears that the new businesses, including the Chinese platform service companies (called "the grey economy" in China), are less able to absorb the increasing number of workers laid off by heavy industries.[29]

One clause that links to labour markets in the Made in China 2025 plan comes in the discussion of cooperation among enterprises. The plan pledges to: "Guide large enterprises and small and medium enterprises to build coordinated relationship of collaborative innovation and win-win cooperation through division of labor based on specialization, service outsourcing and make to order." One might assume that with service outsourcing and made-to-order production there could be an increase in flexible work arrangements such as part-time work, crowdworking and sub-contracting, which will ultimately impact the job and income security of workers. The question thus arises regarding possible revisions to the Labour Law and the Labour Contract Law to allow for increased flexibility in the modes of employment and/or relaxing the stringent restrictions on termination. As of now, no clear information exists on the direction of future revisions.

Chapter 62 of the Five-year Development Plan is on "giv[ing] high priority to employment". The action plan for promoting employment includes: (i) initiatives to improve worker competence (i.e. skills development); (ii) promotion of the employment and entrepreneurial activities of college graduates (i.e. improving transitions from school to work with active labour market policies); (iii) migrant worker vocational skills training; (iv) vocational training for groups with special employment needs; and (v) public services for employment and business start-ups (i.e. business development services). While the objective to re-employ unemployed workers in other fields is found in the chapter's introductory text, no specific action on this is listed in the action plan.

The most specific planning for employment growth and protection is in the Five-year Plan for Human Resources and Social Security Development 2016–2020. This document discusses the role of unemployment insurance and calls for improvements in active employment policy, including improved public employment services. At the same time, it calls for promoting policy support for flexible employment and new forms of employment. Without providing details, the document calls for "strengthen[ing] the monitoring of large-scale unemployment in some regions and industries and establish[ing] a response plan and working mechanism" and also for "implement[ing] the re-employment assistance action, increase[ing] the re-employment support, and do[ing] a good job in resolving the resettlement work in areas of excess capacity". The country has already weathered the mass restructuring that has occurred since the 1980s in the course of state-owned enterprise reforms. From the 1990s, the Government implemented a "re-employment project" that targeted (and was named) "ten million (involuntary laid-off workers) in three

27 See H. Huifeng: "Chinese firms start to cut jobs and move overseas as US trade war and rising costs start to bite", in *South China Morning Post*, 21 September 2018, and R. Woo and L. Zhang: "China factory activity shrinks for first time in over two years, 2019 looks tougher", in *Reuters*, 31 December 2018.

28 FT Confidential Research: "China's factory workers find new careers in services", in *Nikkei Asian Review*, 18 June 2018.

29 O. Wang: "China's gig economy losing ability to absorb laid off factory workers", in *South China Morning Post*, 13 February 2019.

years".[30] Presumably then, the Government is prepared for situations of lay-offs in the process of industrial restructuring.

Are labour standards addressed in relation to planning for Industry 4.0 and/or economic restructuring plans?

Issues like work safety feature heavily in the 13th Five-year Plan but not in the Made in China strategy document.

How is the country approaching the issue of digital labour platforms?

China has seen a proliferation of freelance work in part as a reaction to the Government's **Internet Plus** strategy, which embraces the platform economy as an important engine for the country's economic development and job creation. As workers are laid off from the industries targeted in the country's economic restructuring policies, the digital platforms, in particular app-based transport services, have offered a buffer against unemployment. According to the 2019 report by the Sharing Economy Research Centre of the State Information Centre, the sharing economy drew 760 million participants in China in 2018, among which service providers stood at 75 million and the number of employees hired by platforms reached 5.98 million, a 7.1 per cent and 7.5 per cent increase respectively over the previous year. Some estimates claim that gig workers make up as much as 15 per cent of the labour force in China.[31] What this means in terms of workers' well-being, including access to social insurance, health care and protection of abuses, remains to be seen.

Traditional transport workers, including truck drivers, are becoming increasingly vocal against the competition brought by ride-hailing services. The growing discontent plus the slowdown in the market as it reaches the saturation point in many Chinese cities has pushed the Ministry of Transport to tighten regulations on drivers through stronger enforcement of licensing rules and permits for ride-sharing cars.[32] Greater controls at both the enterprise and government levels are made with the aim of increasing the safety and efficiency of the industry, but the cost is likely to be increased national unemployment as the ability of the platform economy to absorb workers laid off from the industrial sector slows.

Regarding non-location based digital platforms, i.e. for crowdwork, China seems to have wholeheartedly embraced the model, and, according to one article,[33] has recreated it into a system called "managed crowd" – meaning when a large content supplier company sets up its own crowdsource platform to manage specific tasks. For example, Pactera uses Pactwork to farm out millions of audio files for transcribing in various languages in pieces. To become a "supplier" on the Pactwork platform, the supplier must first undertake some training, pass a test and be selected by the reviewing committee, which also ensures the quality of the work. Another example is Tonelink, a crowdsource platform of iSoftstone. From the perspective of a home-based task worker, they would thus seem to be doing subcontracted work for a subsidiary of a supplier company in a complex web of employment relations.

V. What are the roles of social partners and the private sector in the strategies or policies specific to technological developments?

Information about the role of social partners in the formulation process of policies or strategies is lacking.

30 World Bank: "Massive retraining programs in China", Department of International Development and World Bank Collaboration on Knowledge and Skills in the New Economy, undated.
31 V. Rothschild: "China's gig economy is driving close to the edge", in *Foreign Policy*, 7 September 2018.
32 O. Wang, op cit.
33 I. Oshri: "Managed crowdsourcing model: Another 'made in China' idea", in *Computer Weekly*, June 2017.

India

I. Does the country have a specific strategy or plan for advancing on technology-driven growth, including Industry 4.0?

India has a number of strategies or campaigns that either have direct links with technology-driven growth, or link closely with it. For example, the country's **Digital India** campaign launched in 2015 seeks to "transform India into a digitally empowered society and knowledge economy" based on a three-pronged vision of promoting digital infrastructure as a crucial utility to citizens, (digital) governance and services, and digital empowerment of citizens.[34] In its federal budget for the financial year 2018–2019, the Government doubled public investment by allocating US$480 million to support the development of artificial intelligence and other emerging technologies. The Government has initiated the formulation of a new Industrial Policy, which is expected to address subjects including the industrial application of modern technologies such as the Internet of Things, artificial intelligence and robotics for advanced manufacturing.[35] The new Industrial Policy is anticipated to address concerns regarding technological unemployment while increasing technological depth across industries.[36] Furthermore, in 2018, discussions were launched on the formulation of a **National Strategy for Artificial Intelligence** with a focus on its application in health care, agriculture, education, smart cities and infrastructure, and smart mobility and transportation.[37]

II. How does the strategy link to broader strategies/plans for industrialization and economic restructuring?

While the country does not have a specific set of policies or strategies on Industry 4.0, the new industrial policy and the national strategy for artificial intelligence are likely to complement the larger national strategy to promote India as a manufacturing hub under the aegis of the **Make in India** initiative. Make in India was launched by the Government in 2014 to encourage companies to manufacture their products in India and to boost foreign direct investment in 25 manufacturing sectors. Furthermore, the National Institution for Transforming India's (NITI Aayog) **Three-year Action Agenda 2017-18 to 2019–20** placed digital connectivity, S&T and the creation of an innovation ecosystem as important growth enablers to achieve the State's larger goals for national development. The longer-term **Vision 2030** was released by the Government with the 2019 budget. The Vision lists ten dimensions, one of which is to "create a Digital India reaching every sector of the economy" that will result in innumerable start-ups and millions of jobs.[38] Another dimension of the Vision is to build upon the Make in India approach to expand rural industrialization for further employment gains.

Other efforts to boost innovation include **Startup India** (2015) and **Standup India** (2015). Both initiatives aim to encourage the growth of start-ups and drive an entrepreneurial spirit that fosters innovation in the country through support mechanisms such as incubation programmes, tax exemptions and financial support (primarily through the Standup programme).

Some Indian states are especially active in encouraging the development of smart manufacturing. The Government of the State of Andhra Pradesh, for example, aims to turn the state into an Internet of Things hub by 2020. The

34 Ministry of Electronics and Information Technology, Government of India: "Vision and vision areas", Digital India web portal. Available at: https://digitalindia.gov.in [accessed 17 June 2019].

35 Ministry of Commerce and Industry, Government of India: "Formulation of a new Industrial Policy", Press information, 29 August 2017.

36 Department of Industrial Policy and Promotion, Government of India: *Industrial Policy 2017: A Discussion paper* (New Delhi, 2017); Press Trust of India: "Government formulating national policy for advanced manufacturing", in *The Economic Times*, 22 December 2016. It is not entirely clear to the authors of this Annex whether the new industrial policy and the national advanced manufacturing policy are the same planned policies.

37 National Institution for Transforming India (NITI Aayog): *National strategy for artificial intelligence: Discussion paper* (New Delhi, 2018).

38 "Interim Budget 2019–2020", Speech of Minister of Finance Piyush Goyal, Government of India, 1 February 2019.

state government plans to set up ten Internet of Things hubs with the participation of the private sector that will create 50,000 direct jobs in various Internet of Things verticals.[39]

III. How does the country seek to prepare the labour market for the Fourth Industrial Revolution (4IR)?

One of the most fundamental preparations with regards to the 4IR is ensuring that the labour force is digitally literate. It is not surprising, therefore, that one of the Digital India initiative visions is to digitally empower citizens. The initiative envisions universal digital literacy and access to digital resources, along with the availability of resources and (government) services in Indian languages.

Moving beyond simple digital literacy, the Government has prioritized the development of workforce skills – particularly technical, vocational and industrial skills – in order to advance the country towards the goals set by the Make in India initiative of increasing the share of manufacturing in the national GDP. **Skill India** is a government flagship initiative launched in 2015, covering various schemes aimed at providing skills training to 400 million people by 2022. Recently, some skills programmes aimed at preparing the workforce for future technological disruptions have also been initiated or are being planned under the initiative. For instance, the Ministry of Skills Development and Entrepreneurship is reported to be preparing for the introduction of "non-traditional educational pathways in the technical and vocational streams", which include courses aimed at fostering Industry 4.0 skills such as artificial intelligence, Internet of Things, augmented reality and virtual reality.[40]

One clear example of public policy planning aimed at better preparing the workforce for technological disruptions – specifically artificial intelligence – can be found in the discussion paper on the National Strategy for Artificial Intelligence. The document cites the need to reskill the current workforce to meet the emerging demands at workplaces and to prepare students with the requisite skills for the future by aligning education towards STEM-based and application-intensive learning.[41]

Providing financial incentives for employers to reskill their employees, creating open platforms for learning new skills demanded by the market as well as recognizing and standardizing the various informal training institutions that have emerged along with the demand for new-skills are some of the options discussed. Furthermore, incentivizing the creation of jobs in the artificial intelligence solution development value chain that require relatively low levels of expertise is another option discussed, which could serve as a transitional phase before the workforce is able to acquire higher level skills in the industry. With regards to higher education, the document proposes closer ties between educational institutions and the industry, including the redesigning of curricula with inputs from the private sector so as to better match skills demand and supply.

Furthermore, the Government has also initiated the Atal Innovation Mission that seeks to "promote a culture of innovation and entrepreneurship". Under the innovation promotion part of the initiative, Atal Tinkering Labs, Atal Incubation Centres, and Scale-up support to established incubators will be operated. Atal Tinkering Labs, set up in schools across the country, provide work spaces, equipment such as robotics and electronics development tools, 3-D printers and Internet of Things sensors, with the objective of fostering curiosity, creativity, and imagination among the young population and creating a platform where they can learn and develop new skills and ideas.[42]

Similarly, as part of the mission on cyber-physical systems, the Department of Science and Technology will reportedly support the establishment of centres of excellence and invest in R&D, training and skilling in robotics, artificial intelligence, digital manufacturing, big data analysis, quantum communications and the Internet of Things. The Government

39 "What is Industry 4.0 and is India prepared for the change?", proschool online, undated.
40 Ministry of Skill Development and Entrepreneurship and Development, Government of India: "Year-end report of MSDE – More than one crore youth annually joining and benefitting from the Skill India program", Press information, 26 December 2018.
41 NITI Aayog: *National strategy for artificial intelligence*, op cit.
42 P. Bhunia: "Future Skills' platform launched to upskill technology professionals in India", OpenGov, 20 February 2018.

has also announced the establishment of centres of excellence in new technologies such as Fintech, Internet of Things, virtual reality, blockchain, medical technology and electronics products in various parts of the country. The discussion paper on Industrial Policy cites as a medium-term outcome the creation of an enabling environment for the adoption of smart technologies by SMEs in certain sectors.[43]

IV. How does the government foresee protecting workers who are potentially affected by technological disruption?

Based on our review, despite the issue of a potentially sharp rise in technological unemployment over the coming years being widely discussed in the public domain and with companies in India already moving towards embracing automation in their production processes, policy preparations and responses – especially on technological unemployment – have been rather limited.[44] In this regard, the ILO Decent Work Country Programme 2018–2022 for India states that "a realistic approach to technological impact on employment over the coming five years is required".[45] It further states that, "the approach should acknowledge technological progress in new sectors as well as the impact on traditional segments of the economy".

India is expected to introduce a new industrial policy that will reportedly focus on creating new jobs, promoting the manufacturing sector as well as new technologies such as artificial intelligence and robotics, fostering R&D in technology development, and setting up institutional mechanisms to explore and promote commercialization of research undertaken with public funds.[46] The policy is also expected to address concerns regarding technological unemployment while increasing technological depth across industries.[47]

Are labour standards addressed in relation to planning for Industry 4.0 and/or economic restructuring plans?

Labour standards are not explicitly addressed in relation to planning for new technological developments.

How is the country approaching the issue of digital business platforms?

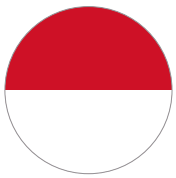
Our review was unable to find specific policies and regulations aimed at digital platform-businesses and the governance of employment relations in such businesses. The question of whether platform-based workers are employees or contractors was, however, taken up in the courts with ***Delhi Commercial Driver Union vs Union of India*** at the Delhi High Court.[48] The withdrawal of the matter has since left the status of platform-based workers undefined.

As far as regulations concerning the operation of digital platform-based businesses, there is some degree of regulatory clarity provided on tech-based ride-hailing apps. The taxi policy guidelines recognize ride-hailing platforms as legitimate service providers and have addressed a number of regulatory issues concerning the business such as registration, passenger safety and fares.[49] The guidelines, however, do not address the issue of ensuring the protection of drivers from exploitation and providing decent working conditions. The issue of exploitation of drivers by ride-hailing platforms and the "deplorable working conditions" were key points raised by the petitioners in *Delhi Commercial Driver Union vs Union of India*.[50]

43 Department of Industrial Policy and Promotion: *Industrial Policy 2017*, op cit.
44 Federation of Indian Chambers of Commerce and Industry (FICCI) and Roland Berger: *Whitepaper – Skills development for Industry 4.0*, BRICS Skills Development Working Group, 2016; TNN & Agencies: "Raymond to replace 10,000 jobs with robots in next 3 years", in *The Economic Times*, 16 September 2016; P.K. Nanda: "How automation is changing face of labour in India", in Livemint, 2 May 2018; E. Gent: "Why automation could be a threat to India's growth", in *BBC Future*, 19 May 2017.
45 ILO: *India: Decent Work Country Programme* (New Delhi, 2018).
46 A. Sen: "New industrial policy to focus on jobs, push tech use, cut red tape", in *The Hindu Business Line*, 23 August 2018.
47 Department of Industrial Policy and Promotion: *Industrial Policy 2017*, op cit.
48 A. Gupta: "Gig economy: Why there is a need to balance employment opportunities with basic rights", in *Financial Express*, 17 December 2018.
49 Ministry of Road Transport and Highways, Government of India: *Report of the Committee constituted to propose taxi policy guideline to promote urban mobility* (New Delhi, 2016).
50 See: Synopsis and List of Dates, *Delhi Commercial Driver Union vs Union of India*. Available at: https://barandbench.com/wp-content/uploads/2017/05/WritPetition-Uber_and_OLA-28.04-FINAL-watermark.pdf [accessed 19 March 2019].

V. What are the roles of social partners and the private sector in the strategies or policies specific to technological developments?

Given the important role of the information technology services industry in India, it is likely that the industry will play a major role in preparing the country for the technological disruptions to come. Some private sector initiatives have already begun to take shape. For example, NASSCOM – a non-profit business association of the information technology business process management industry – has set up a portal "designed as a resource for the IT-ITeS industry to enable discovery, continuous learning and deep skilling in 9 emerging technologies". According to NASSCOM, "the portal has been designed as a marketplace and content library, where the best global providers of content and learning will come together to offer learners information on the latest jobs, the skills needed for those jobs, learning content, assessments and certifications". Subscription to the portal at its launch in February 2018 was only available to members of NASSCOM. However, it is planned to be opened to individual subscribers and non-member firms by April 2019.[51]



Indonesia

I. Does the country have a specific strategy or plan for advancing on technology-driven growth, including Industry 4.0?

Officially known as **Making Indonesia 4.0 (MI4.0)**, the country's implementation roadmap for adopting and integrating technologies for the 4IR is wholly focused on revitalizing the manufacturing sector. The roadmap envisions that Indonesia will rank among the top ten largest economies in terms of GDP by 2030. In order to attain this level of economic progress, three "national aspiration" goals are laid out, as follows: (i) doubling the productivity-cost ratio in order to be globally competitive, which would in turn incentivize companies to reinvest profits and thereby create a virtuous cycle of economic growth; (ii) significantly scaling up exports to be the main drivers of economic growth such that by 2030 net exports account for 10 per cent of GDP, up from 1 per cent in 2016; and (iii) allocating 2 per cent of GDP to R&D in order to drive innovation and promote mastery of technology.[52]

The roadmap also identifies five industries, namely food and beverage, textiles and apparel, automotive, electronics, and chemicals within the manufacturing sector, in which Indonesia will seek to build regional competitiveness by adopting and integrating technologies associated with the 4IR such as artificial intelligence, Internet of Things, advanced robotics, 3D printing, and wearable technologies.

Furthermore, in order to address some of the common challenges that exist across multiple industries in Indonesia, the roadmap identifies ten national priorities for action as listed below:

- Reforming material flow
- Redesigning industrial zones

51 NASSCOM: FutureSkills web portal. Available at: http://futureskills.nasscom.in [accessed 15 March 2019].
52 Ministry of Industry, Government of Indonesia: *Making Indonesia 4.0* (Jakarta, 2018).

- Embracing sustainability
- Empowering SMEs
- Building nationwide digital infrastructure
- Attracting foreign investments
- Upgrading human capital
- Establishing innovation ecosystem
- Incentivizing technology investment
- Re-optimizing regulations and policies

II. How does the strategy link to broader strategies/plans for industrialization and economic restructuring?

As an industrial policy that seeks to leverage emerging technologies in order to boost exports and propel Indonesia into higher levels of prosperity, MI4.0 and the goals and priorities identified under it are closely linked to the larger national planning policies such as the **National Long Term Development Plan 2005–2025** and the **Master Plan of National Industry Development 2015–2035**.[53] Broadly, all three strategies/plans seek to revitalize the industrial sector of Indonesia and to unleash export-led growth supported by a conducive regulatory environment, competent human resources and technological upgrade.

More specifically, however, some of the clearest links between MI4.0 and the National Long Term Development Plan lay in the high priority accorded by both the documents to leveraging innovation and S&T for improving national productivity, increasing the quality and quantity of human resources in STEM fields, and creating a knowledge-based economy. Similar links can be drawn between MI4.0 and the Master Plan of National Industry Development 2005–2025. Both plans focus on developing upstream industries, improving the mastery of industrial technology and preparing a competent human resources pool to drive the transition towards a tech-driven knowledge economy. Furthermore, the two documents also have parallels in terms of the priorities they accord to environmental sustainability and a transition towards a greener economy (see Annex 3).

III. How does Indonesia seek to prepare the labour market for the Fourth Industrial Revolution (4IR)?

Indonesia's strategies to prepare the labour market for the 4IR can be analysed under the priorities identified under MI4.0 and the links to each of the five sectors identified as potential growth engines of the economy.

- Firstly, in order to reduce reliance on imports of raw materials – a challenge facing multiple industries in the country – Indonesia seeks to develop and enhance the capabilities of upstream industries through the application of new technologies and increasing production capacity through training and skills development for workers.
- Improving the quality of the human resources pool in the country is a key priority that cuts across all sectors of strategic importance identified in MI4.0. Indonesia seeks to harmonize the national education curriculum in line with future industry needs. In order to do so, it identifies the need to overhaul the education system, placing a special focus on science, technology, engineering, arts and mathematics education. Apart from mainstream education, the need to upgrade vocational schools and training programmes, improve global labour mobility programmes and attract foreign talent to accelerate the transfer of capabilities have also been identified as important measures. An important complement to revamping the education system and developing human resources is providing the infrastructure and ecosystem for innovation to thrive. Therefore, Indonesia has planned to develop a national innovation blueprint, initiate a pilot innovation centre, optimize related regulations such as those related to the protection of intellectual property rights, and fuel cross-sector collaboration among private sector firms, state-owned enterprises and universities.
- Increasing the capacity of micro, small and medium scale enterprises (MSMEs) also features importantly in Indonesia's plans to augment manufacturing prowess.

53 President of the Republic of Indonesia: "Law of the Republic of Indonesia Number 17 of 2007 on Long-Term National Development Plan of 2005–2025", 2007; details of the Master Plan of National Industry Development are available in: Ministry of Industry, Government of Indonesia: *Industry Facts & Figures, 2015* (Jakarta, 2015).

As close to 70 per cent of the workforce is employed by MSMEs, building the capacity of such enterprises is seen as vital to national prosperity. Measures such as building nationwide e-commerce platforms for farmers and small enterprises to market their goods, increasing access to technology through technology banks as well as providing mentoring and support to drive innovation in MSMEs have been identified to help prepare this section of the labour force and the economy to attain better standards of living.

- Creating a conducive environment for technological adoption is seen as an important step in transforming the economy. Therefore, investments to accelerate national development in broadband speed and digital capabilities have been prioritized, which can have spill over effects for development of digital start-ups and job creation. Also in this area, financial incentives such as tax holidays, subsidies and funding support are to be utilized to promote greater technological adoption. Similarly, attracting foreign direct investment in order to close technological gaps and promote technology transfer to local industries is also a key priority.

IV. How does the government foresee protecting workers who are potentially affected by technological disruption?

It is estimated that the implementation of the MI4.0 roadmap will add from 7 to 19 million jobs to the labour market by 2030.[54] However, the MI4.0 document does not clarify whether its implementation will lead to net job creation or destruction and does not highlight how the Government will tackle a potential rise in technological unemployment. The fact that Indonesia does not have an unemployment insurance scheme in place could make the situation even more challenging under a scenario where there is net job destruction as a result of the implementation of the MI4.0 roadmap. While **Labour Law No. 13** requires that employers pay a one-time severance payment to workers in case of dismissal – which varies according to the employment duration with the same employer – the coverage is largely restricted to the formal sector.[55]

Are labour standards addressed in relation to planning for Industry 4.0 and/or economic restructuring plans?

Labour standards are not explicitly addressed in relation to planning for new technological developments.

How is the country approaching the issue of digital labour platforms?

The Government of Indonesia has made multiple attempts to define a set of regulations that would encompass the ride-sharing apps while also seeking to address concerns regarding competition and fares. However, various government regulations – or parts of them thereof – issued to such an end have been legally contested and subsequently revoked. Both conventional taxi drivers and drivers of ride-hailing apps have been calling for government action in this regard, albeit for different reasons, with the former complaining of unfair competition from ride-hailing apps that are able to offer cheaper fares and the latter demanding better oversight and fares.[56]

The Government has put forth a new set of regulations following the revoking of three ministerial decrees, namely, Minister of Transportation Decree (henceforth, MTD) No. 32/2016, MTD No. 26/2017 and MTD No. 108/2017.[57] The Ministerial Regulation No. 12/2019, issued in March 2019, fixed rules on customer protection and safety for app-based motorcycle taxis. The fixing of minimum and maximum limits on fares came later after further discussion. Only as of May 2019, and in five cities only, was the application of a minimum tariff on

54 Ministry of Industry, Government of Indonesia: *Making Indonesia 4.0*, op cit.

55 ILO: "Indonesia social protection: Building social protection floors and comprehensive social security systems", Social Protection Platform, updated 5 June 2017. Available at: https://www.social-protection.org/gimi/gess/ShowCountryProfile.action?id=444 [accessed 2 February 2019].

56 W. Suzuki: "A ruckus in Indonesia as ride-hailing rules take effect", in *Nikkei Asian Review*, 1 February 2018; C. Silviana and F. Potkin: "Indonesia's plans to regulate ride-hailing threatens Grab, Go-Jek models", *Reuters*, 11 January 2019.

57 OECD, Working Party No.2 on Competition and Regulation: *Taxi, ride-sourcing and ride-sharing services – Note by Indonesia*, Directorate for Financial and Enterprise Affairs Competition Committee, 3 May 2018; S. Yuniarni: "Gov't plans own ride-hailing app; set to issue revised transportation regulation", in *Jakarta Globe*, 18 September 2018.

fares put into effect for app-based motorcycle taxis. [58] The new regulation was formulated following discussions with driver syndicates. The impact of the new tariff regulation will be monitored closely by the Transportation Ministry.

More generally, the Government has also laid down its commitment to improve digital economy-related regulations so as to promote the country as a digital technology hub. Regulatory reforms or new regulations are expected to be introduced in sectors like e-commerce, personal data protection and e-commerce taxation.[59]

In the meantime, an interesting model of promoting employment-related insurance for riders of the ride-hailing platforms has emerged from Indonesia. Go-Jek – the home-grown ride-hailing platform – has partnered with BPJS Ketenagakerjan – the national social security administration body for employment – with the objective of facilitating its partner riders to register with BPJS for employment-related insurance.[60] The registration is facilitated by a custom-made website enabling riders to register conveniently and the monthly fees are deducted directly from their Go-Jek balance. The programme, however, is based on partner riders' contributions and Go-Jek does not make monthly contributions towards the insurance scheme.

V. What are the roles of social partners and the private sector in the strategies or policies specific to technological developments?

The private sector and educational institutions are expected to play an important role in the realization of the goals set under MI4.0, but there is no mention made to the roles of workers' and employers' organizations. It is expected that the implementing body for MI4.0 will consist of stakeholders from the Government, relevant industries and educational institutions.[61] The underlying assumption of the country's industrial policies, including MI4.0, is that the private sector will respond positively to the incentives and conducive regulatory ecosystem created by the Government.

58 The Government's new tariff is capped at Rp 2,000 (0.14 cents) per kilometre, an increase from the previous Grab and GOJEK tariff at Rp 1,600 (0.11 cents) – Rp 1,800 (0.13 cents) per kilometre. S. Yuniarni: "GoJek faces the brunt of Indonesia's new ride-hailing regulation", in *Deal Street Asia*, 6 May 2019

59 R. Aisyah: "Indonesia aims to be regional digital technology hub in 2020", in *The Jakarta Post*, 20 February 2019.

60 A. N. K. Movanita: "Go-Jek Permudah Mitra Driver Jadi Peserta BPJS Ketenagakerjaan", in *Kompas.com*, 14 May 2018; R. M. Siniwi: "Go-Jek drivers join BPJS Ketenagakerjaan" in *Jakarta Globe*, 19 April 2016.

61 Ministry of Industry, Government of Indonesia: "Indonesia's Fourth Industrial Revolution: Making Indonesia 4.0", presentation, 2018; available at: http://www.kemenperin.go.id/download/19347 [accessed 2 February 2019].

Japan

I. Does the country have a specific strategy or plan for advancing on technology-driven growth, including Industry 4.0?

Japan does not have a specific Industry 4.0 plan, but it does adopt a broader policy framework that links to a unique vision for the 4IR. Preferring to bypass Industry 4.0 (where admittedly, it is already heads above most other countries), Japan proposed to move directly to what it terms **Society 5.0** (aka Super Smart Society) whereby advanced digitalization will be applied to all levels of society.[62] The concept was announced in the **Fifth Science and Technology Basic Plan 2016-21**, adopted in January 2016. At its core is the idea of pursing a "human-centred" society that balances economic advancement with societal gains brought about by technological innovations, including artificial intelligence and the Internet of Things.

II. How does the strategy link to broader strategies/plans for industrialization and economic restructuring?

The Society 5.0 strategy is part of the broader Science and Technology Basic Plan. In 2018, the Government set out to review the progress of policies stemming from the Fifth Science and Technology Basic Plan and the **Comprehensive Strategy on Science, Technology and Innovation** (approved in June 2017) with the ultimate aim of learning lessons to accelerate action in a new strategy document. The resulting **Integrated Innovation Strategy**, which aims to support Japan's objective to become the "the most innovation-friendly country in the world", was released in 2018.[63]

Japan's **Artificial Intelligence Technology Strategy** (March 2017) is also an important element of Society 5.0.[64] It characterizes artificial intelligence as a service and foresees three phases for its development and use: (i) expanding use of data-driven artificial intelligence in each service domain, (ii) general use of artificial intelligence and data across services, and iii) the formation of ecosystems through a complex merger of these services. The Strategy applies this framework to the three priority areas of Society 5.0, namely, health, mobility and productivity. In its AI strategy, Japan wants to hold companies responsible for making sure that AI does not infringe on basic human rights, including safeguarding personal data and guaranteeing security. One objective is to ensure transparency on how AI makes decisions, for example, when used to determine whether to extend a loan or recruit someone for a job. Such concepts are embedded in the Council for Science, Technology and Innovation's draft "Social Principles on Human-centric AI", which was issued for comments from stakeholders in February 2019.[65]

III. How does Japan seek to prepare the labour market for the Fourth Industrial Revolution (4IR)?

To "strengthen the fundamental power of science, technology and innovation", Society 5.0 efforts were preliminarily linked to enhancing the country's human resource capabilities through: (i) promotion of training and efforts at attracting young talent, including through fast-track stable career incentives; (ii) strengthening knowledge foundations (university reforms, enhancement of operational functions); and

62 The vision has been given its own website on many ministerial webpages, for example, the Cabinet Office: https://www8.cao.go.jp/cstp/english/society5_0/index.html, including infographics, and numerous promotional videos on Society 5.0 have been produced as well. See also, the home page of the Government of Japan: www.japan.go.jp [accessed 14 March 2019].

63 The document is available at: https://www8.cao.go.jp/cstp/english/doc/integrated_main.pdf [accessed 5 February 2019].

64 ESCAP (2019) makes reference to numerous additional "frontier technology-related policies and policy objectives" in the country that are delineated by specific outcome areas, e.g. on connected industries. For a more detailed picture, see ESCAP: *Evolution of science, technology and innovation policies for sustainable development: The experiences of China, Japan, the Republic of Korea and Singapore* (Bangkok, 2019).

65 The draft document is available on the Cabinet Office webpage: https://www8.cao.go.jp/cstp/stmain/aisocialprinciples.pdf [accessed 9 May 2019].

(iii) addressing funding challenges. But the assessment of progress to date in the Integrated Strategy document was that progress was not fast enough. The Strategy notes that efforts to enhance the supply of human resources for science, technology and innovation were facing organizational inertia:

> *Regarding our efforts towards the enhancement of human resources supporting science, technology and innovation, on the one hand, our universities are facing an organizational inertia, manifesting in the decreasing ratio of young researchers and the continuous brain drain of female researchers. On the other hand, universities are promoting efforts to train and secure a rich diversity of young researchers including female researchers and talents from overseas, other efforts focus on mobility or international brain circulation, but still Japan is backward compared to other major countries.* - (Integrated Innovation Strategy)

To offset some of the perceived shortcomings and to attract the needed talent to fulfil the science, technology and innovation aims of Society 5.0, the Government intends to significantly increase investment in human resource development, expanding information technology know-how outreach through technology itself. Adapting technology is also seen as vital for future productivity gains and for offsetting labour shortages in the agricultural sector. Other links come in Japan's **Lifelong Learning Promotion Law** and **Human Resources Development Promotion Act** where various actions are prescribed to foster an "innovative workforce that will flourish in the future".

IV. How does the government foresee protecting workers who are potentially affected by technological disruption?

The normative setting for promoting science and technological development in Japan does not include direct discussions of possible technology-driven job disruptions. However, in the introduction to the concept of Society 5.0, the Government expresses the need to "break through the five walls" to realize a society in which disruptive changes are expected to occur.

There is thus a recognition that in order to bring about the vision, certain reforms would be needed to promote the positive aspects of disruption and mitigate the negative. One such reform is the **Work Style Reform** (signed in June 2018), a somewhat revolutionary reform set to re-balance the distinction between regular and non-regular workers in the country. The reform also sets out to ensure equal pay for equal work between regular and non-regular workers, address the culture of excessive working hours with a strict cap on overtime, and promote increased flexibility through digital solutions with the express objective of encouraging women's work. Empowering workers to "design their own careers" – i.e. increasing the array of choices on how people work – is to be compensated by increasing the returns to workers through guaranteed long-term employment, thus balancing flexibility with security.

There is ongoing debate concerning the potential impact to employment numbers in the country, with some saying that the labour market reform could lead to an increase in unemployment for workers or aspiring workers without high-tech skills. But others point to the continuing labour shortage in the country (see the ageing section below) that will leave employers little choice but to retrain and hire the technologically unemployed. Also, there are plenty of well-developed labour market policies in Japan that should help to ensure that both retraining and hiring of jobseekers does happen. A good example is the Graduate Support Hello Work programme operated by Hello Work – the Japanese public employment agency – that offers a package of support to young graduates, including job search support, career guidance and facilitated recruitment. The Hello Work programmes are also expected to support the country objective of regularizing non-regular workers through mechanisms like employment subsidies during trial employment periods. Active labour market policies are also embedded in the Comprehensive Reform of Social Security and Tax that seeks to support people throughout their life, including with finding work.

Are labour standards addressed in relation to planning for Industry 4.0 and/or economic restructuring plans?

Labour standards are not explicitly addressed in relation to planning for new technological developments.

How is the country approaching the issue of digital business platforms?

Japan has taken a cautious approach to opening itself to digital labour platforms. Efforts by Uber to find a foothold in the country were stymied in 2016 following widespread protests held by the well-organized taxi industry and labour unions. As a result, the Government released new regulations that essentially ended the proliferation of Uber-like ride-hailing services in Japan's major cities. More recently, however, companies like DiDi are increasingly entering the market by providing ride-hailing apps for licensed taxi operators, which is within the realm of the legislation and avoids the issue where app-based "gig" drivers are without a clearly defined employer and thus have no access to any labour protection.

The Government takes a softer approach regarding digital labour platforms outside the transport domain. Platforms for freelance work such as Crowdworks are increasingly used in the country as opportunities for part-time work. The Government does seem to be aware of the potential contradiction between encouraging a more flexible workforce, including gig workers, as a premise of the Work Style Reform and the danger of platform work exacerbating the already pervasive issue of overwork that the Work Style Reform is also aiming to control. The Action Plan for the Realization of Work Style Reform called for the Ministry of Health, Labour and Welfare to revise its guidelines for home based telework without a fixed contract to include the specific circumstances of crowdworking, including addressing the obligations of digital intermediate agents.[66] The ministry also opened a website for the support of home workers, including crowdworkers.[67]

Regarding the legal status of crowdsourcing sites and the nature of the relationship between the crowdwork platform and the crowdworker, the current labour codes do not yet allow for a clear mechanism for defining where this new phenomenon fits. For the moment, most crowdworkers in Japan are not allotted protection under the labour laws. As a result, the 2017 research study, "Crowdwork and the law in Japan", anticipates that future legal disputes could arise over issues like service fees, non-payment of compensation and leakage of personal information or intellectual property.[68] While the study is already somewhat dated, it undertakes a thorough review of the current legal framework that could apply to the circumstances of crowdworkers, with guidance on where changes would be needed to ensure legal protection on wages, working time and safety.

V. What are the roles of social partners and the private sector in the strategies or policies specific to technological developments?

Society 5.0 was originally advocated by the Japan Business Federation (KEIDANREN). The organization also formulated the action plan to realize Society 5.0. Concerning the 4IR, the Japanese Trade Union Confederation (JTUC-RENGO) is to compile issues and challenges related to this topic and develop concrete measures as part of its action plan 2018–19. In addition, the organization is calling for the Government to establish a framework to better enable the participation of workers' and employers' groups in discussions of measures it is considering. The organization is also requesting that the Government actively support training and reskilling of workers by employers as well as construct an environment that facilitates the self-development efforts of workers.

66 The broader terminology used in the Japanese documents is "non-employment type telework" that refers to workers without contracts who undertake assignments from home. Crowdsourcing is the case when the job is passed via the internet.
67 "Home Workers Web", web portal. Available at: http://homeworkers.mhlw.go.jp/ [accessed 17 June 2019].
68 K. Kezuka: "Crowdwork and the law in Japan", in B. Waas et al. (eds): *Crowdwork – A comparative law perspective* (Frankfurt, Bund-Verlag GmbH, 2017).

Korea, Republic of

I. Does the country have a specific strategy or plan for advancing on technology-driven growth, including Industry 4.0?

In 2017, the **Presidential Committee on the Fourth Industrial Revolution (PCFIR)** was set up under the aegis of the Presidential Decree on the Creation and Management of PCFIR.[69] The PCFIR is the focal point for deliberations upon, and coordination of, important policy issues relating to "the development and acquisition of new science and technology, including Artificial Intelligence (AI) and data technology as well as new industries and services necessary for Korean society's adaptation to the 4th Industrial Revolution".

According to the PCFIR, in addition to deliberating upon and coordinating policy measures submitted by various ministries and committee members, it is also responsible for: organizing public information and awareness campaigns on the 4IR and encouraging public participation; laying the groundwork for reforms – both regulatory and institutional – in support of public-private partnerships; and creating a conducive environment for the growth of new industries. With this mandate, the PCFIR in November 2017 released **I-Korea 4.0**, its "people-centred" plan for the 4IR.[70]

It is worthwhile to note that the previous Government of the Republic of Korea, in 2016, produced the Artificial Intelligence Information Industry Development Strategy "**Mid- to Long-Term Master Plan in Preparation for the Intelligent Information Society: Managing the Fourth Industrial Revolution**". This document set the vision, strategy and policy goals and associated tasks to achieve an "intelligent information society".[71] It also produced a report entitled "**Finding a path to future jobs: Future trends, human competencies and innovation system for jobs in the 4th industrial revolution**", which examined the potential trends of future jobs and labour market dynamics and discussed potential approaches the country could take in order to prepare for such changes.[72]

II. How does the strategy link to broader strategies/plans for industrialization and economic restructuring?

The Government has made strong advances in promoting digitalization, including a focus on e-government, since the 1990s. More recently, it has made innovation-led growth one of the three pillars of its economic policy, with the other two being income-led growth and achieving a fair economy.[73] Furthermore, the "preparation for the Fourth Industrial Revolution by supporting the advancement of science and technology" features within the "Five-year Plan for Administration of State Affairs" of the current administration.[74]

The outcomes of PCFIR deliberations and reviews are to be reflected in the national master plans and strategies on the 4IR; executive plans and major policies of various ministries regarding this topic; measures aimed at supporting S&T and the development and innovation of core technologies (such as artificial intelligence and ICT) necessary for the 4IR; and measures to foster new industries and services through the integration of intelligent technologies into existing industries.

69 The website of the Presidential Committee on the Fourth Industrial Revolution is www.4th-ir.go.kr/home/en [accessed 13 June 2019].
70 Presidential Committee on the Fourth Industrial Revolution, Government of the Republic of Korea: *I-Korea 4.0: People-centred "Plan for the Fourth Industrial Revolution" to promote innovative growth*, 2017.
71 Government of the Republic of Korea: *Mid- to Long-Term Master Plan in Preparation for the Intelligent Information Society: Managing the Fourth Industrial Revolution*, 2016.
72 Ministry of Science, ICT and Future Planning, Government of the Republic of Korea: *Finding a path to future jobs: Future trends, human competencies and innovation of system for jobs in the 4th industrial revolution*, 2017.
73 Ministry of Economy and Finance, Government of the Republic of Korea: *2019 Economic Policies*, 2018.
74 Government of the Republic of Korea: *100 policy tasks: Five-year plan of the Moon Jae-in Administration*, 2017.

In 2018, the Ministry of Science, ICT and Future Planning released a report entitled "**The Innovation Growth Engine**", which outlines the key areas or industries that the Government seeks to promote in preparation for the 4IR.[75] These include big data, next-generation communications, artificial intelligence, autonomous (driving) vehicles, drones, customized health care, smart city, virtual and augmented reality, intelligent robot, intelligent semiconductor, advanced materials, innovative new drugs, and new and renewable energy. The document also lists the relevant ministries and divisions responsible for the promotion and development of each of the aforementioned industries.

III. How does the country seek to prepare the labour market for the Fourth Industrial Revolution (4IR)?

The I-Korea 4.0 plan of the PCFIR outlined a four-point strategy to prepare the country for such a transition: (i) promoting intelligent innovation-based projects; (ii) securing technology for growth; (iii) strengthening industrial infrastructure and creating a conducive ecosystem for new industries; and (iv) responding to future social change.

While each point has linkages to the labour market, the fourth and final action area of the strategy is the one that most directly focuses on responding to social changes brought about by the 4IR, including labour issues. Supporting core talent growth, innovation in the education system to prepare for the future, expanding the job safety net, and strengthening responses to cyber-ethical dysfunction are the key areas addressed therein.

The country seeks to generate a core talent pool of around 46,000 skilled workers in areas such as artificial intelligence, big data and cyber security and expand training opportunities in specialized new industries, including through initiatives to attract both new and experienced scientists in relevant fields. In order to do so, I-Korea 4.0 envisions improved industry-academia collaboration and an increase in field-based and project-based learning. It also seeks to nurture professional talent with competencies required in areas such as ship-building, smart factory operation and machinery and steel production. Plans to overcome skills shortages are also taken up in **the Innovation Growth Engine** document, which sets a target of 1,370 talents in artificial intelligence by 2022, including 350 key researchers; and an award of 4,500 domestic scholarships in artificial intelligence. The ministry also announced a short-term project to address the artificial intelligence talent shortage with six-month intensive training courses that will gestate 600 young talents by 2021. Meanwhile, universities are being encouraged to set up artificial intelligence courses.

In order to strengthen domestic research competitiveness in intelligent technologies such as artificial intelligence and the Internet of Things where national research capacity is limited, the plan envisions attracting foreign talents and researchers. Measures on skills development and strengthening the R&D capacity of SMEs for better 4IR preparedness are also outlined in the Ministry of Labour and Employment's **2016–2030 4th Industrial Revolution and Human Resources Demand Forecast** (henceforth 4IR-HRDF). This document outlines a host of areas for recalibrating the education system to meet the needs of the future such as online course work and customized learning environments.

Policy aims laid down in the annual economic policy documents also articulate – albeit in limited fashion – potential courses of action to meet the human resource needs of the 4IR. In the 2018 Economic Policies document, the Government set forth its commitment to promote economy-wide innovation-led growth. Some of the key measures highlighted in connection with creating a conducive environment for innovation to drive economic growth are: augmenting the country's human resources pool by introducing new programmes aimed at encouraging creative learning in secondary schools; revising the job training system; introducing a joint job-training system with industrial clusters; and increasing job-training support for new entrants to the labour market, small self-employed business

75 Ministry of Science, ICT and Future Planning, Government of the Republic of Korea: *The innovation growth engine: Leading preparations for the Fourth Industrial Revolution*, 2018. For a more in-depth review of the science, technology and innovation policies in the four arguably most advanced countries, see ESCAP: *Evolution of science, technology and innovation policies for sustainable development: The experiences of China, Japan, the Republic of Korea and Singapore* (Bangkok, 2019).

operators, young adults and women returnees to the workforce.[76]

Some of the other policy priorities highlighted by the document in relation to driving innovation that have links to labour market dynamics are increasing spending on R&D and other financial support to developments in areas such as building data centres and infrastructures, developing fin-tech, and autonomously driving vehicles. The 2019 Economic Policies document builds on the previous year's, setting forth the Government's priorities such as preparing the workforce by enhancing school education, conducting job trainings for college graduates, and expanding occupational training programmes for low-skilled workers.

IV. How does the government foresee protecting workers who are potentially affected by technological disruption?

Employment-related concerns feature in I-Korea 4.0 and a number of measures are outlined to expand employment safety nets as the economy adapts to new demands. Labour market policies expected to aid the 4IR include improved job forecasting using big data analytics, more adept public employment services, including trainings and relocation services for displaced workers, and stronger guarantees of social protection.

Employment-related concerns are also well covered in the broad national economic plans. The first item in the Government's Economic Policies 2018 is to create jobs and improve income with action areas on minimum wage increases, revision of regulations on unpaid wages, and work-life balance (among others). The second priority outcome is "growth through innovation". It is likely that the policies foreseen to promote innovation across industries will be implemented with aspects of decent work in mind. Pursuing inclusive growth and the policy measures envisaged with regards to social protection have been articulated in the economic policies publication. Expanding earned income tax credit benefits, introducing unemployment support systems for those not already covered by national unemployment insurance, increasing unemployment benefits, and extending the coverage of social security benefits are some policy measures listed in the 2019 Economic Policies document.

The Republic of Korea has an employment insurance system anchored in legislation, with a contributory social insurance scheme providing unemployment-related benefits. It is also covered by a range of active labour market policies such as public employment services and vocational training for the unemployed.[77]

Are labour standards addressed in relation to planning for Industry 4.0 and/or economic restructuring plans?

The current administration's Economic Policies documents for 2018 and 2019 address some issues related to labour standards issues such as social protection, reduced working hours for better work-life balance and increasing supervision of unfair practices at the workplace such as unpaid wages. Labour standards in relation to the 4IR and economic restructuring plans in the country are more directly found in the I-Korea 4.0 plan. The plan envisions making regulatory and legislative changes in order to reflect the changing work environment, addressing concerns surrounding special work arrangements, and broadening the scope of labour welfare-oriented legislation such as occupational safety and health regulations, to include platform-based workers. The plan places importance on the role of social dialogue in this regard. These points are also highlighted in the 4IR-HRDF report.

How is the country approaching the issue of digital labour platforms?

The Republic of Korea has sought to raise investments for the development of a platform economy in the country. The 2019 Economic Policies have identified the need to build a platform economy for various industries and the Government plans to spend 5 trillion won in 2019 on "growth through innovation" and to invest around 9-10 trillion won in the platform economy over the course of the next five years.[78] Specifically, it has identified four projects in this

76 Ministry of Economy and Finance, Government of the Republic of Korea: *2018 Economic Policies*, 2017.
77 S. H. Lee: *Employment insurance scheme of Korea* (Korea Employment Information Service, 2016).
78 Ministry of Economy and Finance, Government of the Republic of Korea: "'Growth through innovation' investment plan", Research and Development Finance Division, Press release, 13 August 2018.

regards, namely building a big data platform, easing the data divide, building a hydrogen fuel cell supply chain, and developing an education programme to create around 10,000 qualified personnel over the next five years.

The 4IR-HRDF and I-Korea 4.0 strategies both highlight the need for regulatory reforms in consideration of the changing nature of employment relationships, including the rise of platform-based work. The Government has taken some tentative actions. For instance, following opposition from taxi associations to the introduction of carpooling services by a ride-hailing app, a social dialogue body was launched with participation from the Government and taxi and carpooling services with a view to finding common ground over the operation of shared mobility.[79] More definitively, in January 2019, a forthcoming revision to the **Act on Industrial Safety and Health** was announced with one of the planned revisions being the inclusion of platform workers under the protection of the law.[80]

V. What are the roles of social partners and the private sector in the strategies or policies specific to technological developments?

The PCFIR, the focal point for 4IR-related policy planning and coordination, has 25 members including one chairperson. The committee's inaugural members consist of multiple ministers and members of the Government, several business/private sector representatives, academics and one member from the Federation of Korean Trade Unions.

The Government has identified the key role of the private sector in leading the country towards the next generation of innovation. I-Korea 4.0 envisions the Government playing a facilitating role in order to create a conducive environment for the private sector to spearhead innovation. Similarly, I-Korea 4.0 and 4IR-HRDF both highlight the importance of social dialogue to discuss and resolve problems arising in the process of the 4IR, for example, through bodies such as the tripartite committees.

A tripartite body was set up in the Economic, Social and Labor Council to look at the future of work trends and to jointly generate policy advice on measures needed to counteract the risks that digitalization, including the spread of the platform economy, would potentially have on the quality of work. The **Committee for Digital Transition and the Future of Work** was launched in July 2018 with a one-year renewable term.[81] It consists of representatives from the Ministry of Employment and Labour, the Ministry of Science and Technology, employers' organizations, trade unions, academia and civil society. In February 2019, the Committee formulated a draft tripartite agreement on digitalization.[82] Among the tasks expected of the Government in the draft agreement are reinforcement efforts for investing in lifelong learning, providing institutional safeguards such as social safety nets to minimize the adverse effects of digitalization, and resolving conflicts among stakeholders that may arise due to the proliferation of digital platforms. A green paper on policy directions can be expected from the Committee at the end of its term in July 2019.

79 "Social dialogue body on taxi, carpooling services launched", in *The Korea Bizwire*, 22 January 2019.
80 Ministry of Employment and Labor, Government of the Republic of Korea: "Industrial Safety and Health Act revised", Press release, 15 January 2019.
81 Economic, Social and Labor Council: "Committee for Digital Transition and the Future World of Work was launched", 21 July 2018.
82 Economic, Social and Labor Council: "Basic agreement on tripartite recognition and policy tasks for digital conversion", 21 March 2019 (draft in Korean).

Lao People's Democratic Republic

I. Does the country have a specific strategy or plan for advancing on technology-driven growth, including Industry 4.0?

The Lao People's Democratic Republic has not yet developed a specific strategy or plan that lays out policy objectives on how the country intends to advance technology-driven growth, and how it plans to adapt to the potential disruptions in global value chains as a result of technological disruptions. However, the discourse on the 4IR, though rather limited, is not entirely absent in the country. The government's views and attitudes towards the 4IR, based on accessible media reportage, suggest it sees the 4IR as an opportunity to leapfrog from its current development stage to one that is defined by advanced technology and a knowledge-based economy.[83]

II. How does the strategy link to broader strategies/plans for industrialization and economic restructuring?

While there is no explicit mention of the 4IR in the **8th National Socio-Economic Development Plan 2016–2020**, the planned development outcomes and their corresponding outputs identified in the document place the promotion of technological development, fostering innovation and developing a competent human resource pool in the country as key vehicles for driving sustained inclusive growth. The larger national planning documents such as **Vision 2030** and the **Ten-year Socio-Economic Development Strategy (2016–2025)** also emphasize innovative growth and the promotion of industrialization and modernization of the economy.[84]

III. How does the country seek to prepare the labour market for the Fourth Industrial Revolution (4IR)?

The 8th National Socio-Economic Development Plan outlines some key outputs that lay the foundation for 4IR-related developments to evolve. For example, under the first headline outcome on sustained inclusive growth and reduced economic vulnerability, the Government has prioritized the promotion of research as well as the application of S&T and making TVET curricula more responsive to industry demands in each time period. Under the same outcome, the document underscores the importance of developing human resources in S&T fields – particularly in domains such as building and construction; electrical, civil, mining and geographical engineering; and automotive mechanics – and the adoption and promotion of new innovations and technologies by entrepreneurs and businesses. Developing technical education among the youth, in particular those belonging to disadvantaged groups in terms of gender, ethnicity, disability and geographic remoteness, has likewise been identified as an important driver of development.

Technological development also features as a cross-cutting policy priority within the document. Importantly, it views technological development as a vehicle to advance sustainable development, better respond to disaster events, and adapt to and mitigate climate change-related impacts. Beyond presenting the policy focus of the State, the document also delineates some specific targets with regards to technological developments and innovation to be achieved by 2020, such as: doubling R&D investments from 1 to 2 per cent in public universities, training 11 researchers per 10,000 of the population, establishing two ICT application learning centres at village and district levels,

83 Asia News Network: "Lao enterprises learn latest industrial digital transformation challenges", in *Vientiane Times*, 14 September 2017; Asia News Network: "World Economic Forum: Laos calls for collective effort to advance ASEAN", in *Vientiane Times*, 13 September 2018.

84 Ministry of Planning and Investment, Government of Lao Peoples' Democratic Republic: *8th Five-year National Socio-Economic Development Plan (2016–2020)*, June 2016.

increasing computer and internet literacy to 30 per cent and 40 per cent of the population respectively, and improving nationwide ICT connectivity, among others.

The mid-term review of the 8th National Socio-Economic Development Plan highlights the need for continued efforts towards improving technological capabilities and fostering innovation in order to attain sustained growth by building productive capacities and advancing structural transformation. Promoting linkages between firms and sectors, augmenting innovation systems, and furthering skills and technology transfers through foreign direct investment are identified as key ways of advancing towards such an end.[85] Furthermore, legislative reforms have been carried out with a view to creating a conducive innovation environment. For instance, the law on intellectual property and regulations on implementation of trademarks, copyrights and industrial patents have been enacted to support and encourage research, development and innovation.

IV. How does the government foresee protecting workers who are potentially affected by technological disruption?

Based on our review, technological unemployment and underemployment have not featured prominently in the discourse on the 4IR in Lao People's Democratic Republic. However, the amended **Law on Social Security (Ref. No 34/NA, 26 July 2018)** has created the legal basis for social insurance, including unemployment benefits, which is comprised of limited period income replacement, calculated as 60 per cent of the average of the last six-months' salary before unemployment; and provisions relating to vocational training, career counselling and job placement assistance.[86] According to the ILO *World Social Protection Report 2017–19*, social insurance in the country was implemented in 2016.[87] Therefore, while questions remain on the coverage of social insurance and its ability to cope with potential unemployment, the system at least is in place.

Are labour standards addressed in relation to planning for Industry 4.0 and/or economic restructuring plans?

The only labour standards subject with a detailed focus in the 8th National Socio-Economic Development Plan is improving access to social protection, although not in relation to planning for the 4IR.

How is the country approaching the issue of digital business platforms?

Our review was not able to find specific regulations or policy planning with regards to the governance of digital platform-based businesses and employment relations in such businesses.

V. What are the roles of social partners and the private sector in the strategies or policies specific to technological developments?

The Government has stated that both the public and private sectors have important roles to play in moving the country ahead in the new industrial age although there is no specific mention made to the roles of workers' and employers' organizations. A specific area where it has aimed to engage the private sector to advance technological development is in the development of mechanical and technical human resources.

85 Ministry of Planning and Investment, Government of Lao People's Democratic Republic: Mid-term Review of the Eighth National Socio-*economic Development Plan, 2016–2020*, 2018.

86 National Assembly of Lao People's Democratic Republic: *Law on Social Security (Unofficial translation)*, Ref. No. 34, Vientiane, 26 July 2013.

87 ILO: *World Social Protection Report 2017–19* (Geneva, 2017).

Malaysia

I. Does the country have a specific strategy or plan for advancing on technology-driven growth, including Industry 4.0?

In October 2018, the Government of Malaysia launched its **National Policy on Industry 4.0** (Industry4WRD).[88] Malaysia is one of the few countries that views the development of Industry 4.0 explicitly in line with the 2030 Agenda for Sustainable Development, directly citing SDG 9 on industry, innovation and infrastructure, and SDG 12 on responsible consumption and production. The Policy emphasizes the need to embrace Industry 4.0 and views it as a tool for the development of the manufacturing sector. No references to other economic sectors are made. The Policy identifies the main issues and challenges to be tackled, formulates policies to facilitate the adoption of Industry 4.0 and sets specific goals and targets. As a means to achieve those goals and targets, the Policy defines 13 broad strategies. More generally, it identifies the following action areas as key to developing the country's ecosystem for Industry 4.0: (i) upskilling and reskilling; (ii) inclusive involvement of SMEs; (iii) significant evolution in innovation; (iv) focused funding support; and (v) good digital infrastructure.

With regards to sectors, the document's strategies for encouraging increased productivity and higher value-added production are targeted to the following "high-potential" industries: electrical and electronics, machinery and equipment, chemical, medical devices, aerospace, and other sectors (automotive, transport, textiles, pharmaceutical, metal, food processing, services).

Malaysia's Industry4WRD also includes some information on its suggested implementation process. The Ministry of International Trade and Industry is in charge of the oversight and management of an Industry4WRD Council, which it chairs and which is composed of government and industry representatives. The Council's task is to "coordinate all stakeholder activities and drive progress". In addition, the responsibility for each one of the 13 broad strategies is assigned to one or more lead agencies, including ministries as well as private sector organizations.

As well as a national policy that focuses on the manufacturing sector, there is also a public sector strategy in relation to new technological developments. In March 2016, the Malaysian Government released its **Public Sector ICT Strategic Plan 2016–2020**.[89] The Strategic Plan includes 12 strategies under five strategic thrusts to promote, develop and integrate digital services provided by the Government, foster a "data-driven government", strengthen ICT infrastructure and cyber security, and establish a public workforce endowed with the necessary skills. In order to implement the Plan, the Malaysian Administrative Modernisation and Management Planning Unit is assigned to be lead agency for most of the strategies, in some cases jointly with other public agencies.

II. How does the strategy link to broader strategies/plans for industrialization and economic restructuring?

In May 2015, the **Eleventh Malaysia Plan 2016–2020**, which sets economic and social targets for the medium term, was released.[90] The Plan itself does not include any explicit reference to Industry 4.0 but focuses on skills and human capital development in one of the six strategic thrusts defined in the report, in line with the Industry4WRD plan. More specifically, the Plan defines the acceleration of "human capital development for an advanced nation" as a strategic thrust.

88 Ministry of International Trade and Industry, Government of Malaysia: *Industry 4WRD: National Policy on Industry 4.0 – Attract, Create, Transform* (Kuala Lumpur, 2018).
89 Malaysian Administrative Modernisation and Management Planning Unit: *The Malaysian Public Sector ICT Strategic Plan 2016–2020*, undated.
90 Government of Malaysia: *Eleventh Malaysia Plan 2016–2020: Anchoring growth on people*, 2015.

III. How does the country seek to prepare the labour market for the Fourth Industrial Revolution (4IR)?

The main focus of Industry4WRD in relation to the labour market is skills development, with two of the 13 broad strategies defined in the policy related to this policy area. For both strategies, the Ministry of Education and the Ministry of Human Resources are assigned as lead agencies.

The first of the two strategies aims to "enhance capabilities of the workforce through national development programmes specifically designed for specific manufacturing sectors and support reskilling and upskilling". By focusing on skills development, the strategy intends to upskill the existing workforce, increasing overall labour productivity as well as the number of highly skilled workers with high wages in the manufacturing sector. A specific numerical target is set for labour productivity in the manufacturing sector, aimed at a 30 per cent increase by 2025, compared to the 2016 value. There is also a target defined for the share of highly skilled workers in the manufacturing sector, the objective being an increase from 18 per cent in 2016 to 35 per cent in 2025. Moreover, the strategy explicitly mentions potential job losses as a result of automation and technology adoption and recognizes reskilling as a means to mitigate such adverse effects.

The strategy includes a number of activities and programmes, including the creation of Industry 4.0 Talent Competency & Technology Mentoring programmes, the establishment of Skills Certification programmes in Industry 4.0 areas, the development of training courses for the reskilling of transitioning employees, the use of augmented or virtual reality in classroom modules, and the availability of data on Industry 4.0 talent and labour pools.

The second strategy aims to "ensure the availability of future talent by equipping students with the necessary skillsets to work in the Industry 4.0 environment" in order to fulfil the skills demands of the manufacturing sector in the longer term. As priorities, TVET and STEM education are mentioned. The strategy envisages the organization of programmes through collaboration between industry and academia, and also mentions the need to promote the high-tech manufacturing industry as an attractive employer, to impact students' education choices accordingly. Envisaged outcomes are a continuous supply of human resources with the skills relevant for Industry 4.0 in the manufacturing industry, an increased number of TVET and STEM students, and increased collaboration between academia and industry.

The strategies' activities and programmes consist, among others, of increased funding for TVET, adaptation of tertiary education curricula to the needs of Industry 4.0, promotion of manufacturing as a preferred choice for skilled workers, and increasing the capability of educators, trainers and instructors in manufacturing-related education sectors.

At the broader policy level, the Eleventh Malaysia Plan features some direct links to the labour market that could have an impact on the preparation of the labour force for the next generation of technological changes. The Plan's objectives mention the improvement of labour productivity and the creation of more job opportunities for highly skilled workers. One of the strategies that forms part of the strategic thrust is "improving labour productivity and wages through the shift to high-skilled jobs". The Plan also mentions improved TVET as an objective, with three directly related strategies, namely "strengthening the governance of TVET for better management", "enhancing quality and delivery of TVET programmes to improve graduate employability", and "rebranding TVET to increase its attractiveness". The enabling of industry-led TVET is even defined as one of the six "game changers" within the Eleventh Malaysia Plan. Finally, the Plan refers to STEM education, emphasizing the reinforcement of STEM "through enquiry-based and hands-on learning opportunities".

Thus, the Industry4WRD plan to a large extent overlaps with the Eleventh Malaysia Plan, as it also sets concrete targets for labour productivity and the share of highly skilled workers for the manufacturing sector only. Similarly, it also emphasizes TVET and STEM as tools to improve the availability of human resources endowed with the skills required for Industry 4.0. However, the National Policy on Industry 4.0 mentions the Eleventh Malaysia Plan only once explicitly, when referring to the current development of the manufacturing sector, which is "on track to achieve the targeted annual GDP growth rate of

5.1% under the 11th Malaysia Plan".

Besides skills and human capital development, the Eleventh Malaysia Plan emphasizes the importance of inclusiveness. The Plan defines the enhancement of "inclusiveness towards an equitable society" as one of the six strategic thrusts, clearly stressing the importance of sharing socio-economic benefits with the whole population regardless of gender, ethnicity, socio-economic level and geographic location. According to the Plan, employment and entrepreneurial opportunities as well as access to quality education should be enjoyed by all, in particular "vulnerable groups". The Industry4WRD plan, for its part, does not contain any reference to inclusiveness nor does it explicitly mention that the benefits of Industry 4.0 are to be shared by all.

Finally, the **Public Sector ICT Strategic Plan 2016–2020** mainly relates to skills development, with two out of 12 strategies aimed at improving the skills sets of public sector ICT personnel. The Plan's strategies work towards strengthening the ICT personnel placement process and ICT job profile management, and aim to enhance public sector ICT career advancement, competencies and professionalism.

IV. How does the government foresee protecting workers who are potentially affected by technological disruption?

The Industry4WRD plan does not directly state that job losses are expected as the country adapts to new technologies. However, it does mention a need to mitigate the potential impact on jobs by "support[ing] reskilling and upskilling". Skills policies are thus how the Malaysian Government, through the Industry4RWD plan, foresees protecting workers from technological disruption. There is no mention of supporting technologically disrupted workers through other active labour market programmes, although job-seekers could benefit from services that already exist. In January 2018, Malaysia introduced the Employment Insurance Scheme.[91] The scheme is, in fact, an unemployment benefit system, which collects contributions from employers and workers, each amounting to 0.2 per cent of the monthly salary. These contributions are put in a fund to provide financial assistance to retrenched employees. There is also job search assistance for all job-seekers that meet the scheme's eligibility requirements, thus including persons who are laid off as a consequence of automation.

Are labour standards addressed in relation to planning for new technological developments?

Only the Prime Minister's Foreword to the Industry4WRD plan makes reference to labour standards, referring to occupational safety and health in the workplace. In this foreword, Industry 4.0 is seen as having the potential to address issues related to the "health and safety of human labour" in the manufacturing sector. Other than this, there is nothing specific in the document on establishing standards for occupational safety and health or enforcing labour standards in any form.

How is the country approaching the issue of digital labour platforms?

Malaysia regulates the ride-hailing platform industry with a recent 2017 amendment to the Land Transport Act 2010 (Act 715) and the Commercial Vehicles Licensing Board Act 1987 (Act 334).[92] Such legislation relates to the registration of ride-hailing operators, requiring drivers to have an intermediation business license (a public service vehicle license), but without detailing the employment status of the driver or providing details on the applicability of labour standards to their work.

Recently there have been some discussions in Malaysia about extending the social security system to platform workers in the digital economy.[93] More specifically, the Malaysian Deputy Prime Minister gave a speech in October 2018 at the International Social Security Association's Regional Social Security Forum for Asia and the Pacific, mentioning the need to broaden the coverage of the Self Employment Social Security Act 2017 accordingly. However, there has been no change in laws to date.

91 See Social Security Organisation, PERKESO Prihatin official website: https://www.perkeso.gov.my/index.php/en/employment-insurance-system-eis [accessed 17 June 2019].
92 M. Iyahar bin Mohamad Iyzham: "Regulating e-hailing in Malaysia: Is there over-regulation", Asia Law Portal, 13 December 2018.
93 "DPM: 13.7 million Malaysian workers do not have social security protection", in *Malaymail*, 2 October 2018.

V. What are the roles of social partners and the private sector in the strategies or policies specific to technological developments?

The Industry4WRD plan was developed in close consultation with several ministries, including the Ministry of Human Resources, business representatives and other agencies. There is no evidence found to demonstrate that trade unions participated in the process. The policy was developed on the basis of discussions in technical working groups led by ministries and workshops as well as inputs from interviews with business leaders from the manufacturing sector. With regards to the policy's implementation, an Industry4WRD Council, chaired by the Minister of International Trade and Industry and composed of government and industry representatives, will "coordinate all stakeholder activities and drive progress". Responsibility for some broad strategies are assigned to private sector organizations.

Information on the role of social partners and the private sector is not clearly identifiable in the Public Sector ICT Strategic Plan 2016–2020.

Myanmar

I. Does the country have a specific strategy or plan for advancing on technology-driven growth, including Industry 4.0?

Myanmar, based on this review, does not have a specific strategy aimed at orienting its economy and society towards technology-driven advancements. However, Industry 4.0, its potential ramifications and discourses on crafting a response to such changes have been broached in media reports and think pieces. Statements from the State Counsellor of Myanmar outlining how the country seeks to prepare for the 4IR provide some insights into where its focus lies in this regard.[94] Investing in education, with a focus on practical skills, and providing business development support to entrepreneurs and start-ups are outlined as key ways to ensure that Myanmar adapts to the tech-driven disruptions across industries. More generally, the "human factor" is considered to be among the most important aspects of the 4IR and the country's approach to tech-related disruptions is stated to be based on its belief in qualities such as the "creativity, empathy, and stewardship" of its people.

II. How does the strategy link to broader strategies/plans for industrialization and economic restructuring?

Broader policy documents such as the **Myanmar Sustainable Development Plan 2018–2030** and the **Industrial Policy of 2016** have direct and indirect links to technology and digitization-led growth. For example, strategy 3.7 of the Myanmar Sustainable Development Plan lays down the State's commitment to the 4IR and policies aimed at promoting creative industries and creative disruptions, innovation, R&D and

94 Refers to State Counsellor Aung San Suu Kyi's statement at the World Economic Forum on ASEAN, Hanoi, 11-13 September 2018; K. W. Chern: "Myanmar will focus on developing talent for 4IR: DASSK", in *The Myanmar Times*, 13 September 2018.

entrepreneurship.[95] It identifies the need to close the gap with its peers in the adoption of technologies and the creation of a knowledge-based economy with a pool of human resources equipped with 21st century skills sets.

On the other hand, the industrial policy – without referring directly to the 4IR – sets policy priorities such as human resource development, technology and innovation-related developments, business development services and financial assistance to support actions in these areas to spur industrial development.[96] The Economic Policy of the Union of Myanmar also outlines policy priorities such as creating a pool of competent human resources required to advance development, fostering an enabling environment for technological development and innovation, and establishing opportunities for workers returning from abroad.[97] Such actions could create important positive externalities with regards to laying the foundations for 4IR-related developments in Myanmar.

III. How does the country seek to prepare the labour market for the Fourth Industrial Revolution (4IR)?

Based on the aforementioned broader policy documents and the statement from the State Counsellor of Myanmar on the country's preparation for the 4IR, investments in education, including practical and applied skills, features prominently as a measure to equip the workforce with the skills needed for changing the industrial landscape. Strategy 4.1 of the Myanmar Sustainable Development Plan, which seeks to "improve equitable access to high quality lifelong education opportunities", expands the demographic horizon for learning opportunities. Furthermore, state support for business development, R&D and, more broadly, to private sector-led growth and job-creation are expected to propel Myanmar forwards.

IV. How does the government foresee protecting workers who are potentially affected by technological disruption?

The policy documents reviewed do not discuss or address concerns related to technological unemployment. The Social Security Act of 2012 does provide for unemployment-related benefits, but it is yet to be implemented.[98]

Are labour standards addressed in relation to planning for Industry 4.0 and/or economic restructuring plans?

Strategy 4.5 of the Myanmar Sustainable Development Plan seeks to "protect the rights and harness the productivity of all, including migrant workers". Specifically, Action Plan 4.5.5 is aimed at protecting labour rights and promoting safe and secure working environments for all workers, including migrant workers. The strategy commits state action towards ensuring that workplaces are free from oppression, discrimination and harassment, with special attention placed on protection of the rights of women, children and migrant workers.

Additionally, a number of other labour standards issues are addressed in various action plans under Strategy 4.3 of the Sustainable Development Plan, such as enforcing the minimum wage, combating child labour, strengthening public employment programmes and strengthening social protection.

How is the country approaching the issue of digital labour platforms?

Our review was not able to find specific regulations or policy planning with regards to the governance of digital labour platform-based businesses and employment relations in such businesses. While the Government had reportedly been planning to issue regulations in the tech-based ride-hailing service industry, we were unable to verify whether such a policy had already been formulated and is currently under implementation.[99] On the other hand, local ride-hailing platforms have voiced concerns

95 Ministry of Planning and Finance, Government of Myanmar: *Myanmar Sustainable Development Plan (2018–2030)*, 2018.
96 Ministry of Industry, Government of Myanmar: *Industrial Policy*, 2016.
97 Myanmar Information Management Unit: *Economic Policy of the Union of Myanmar,* 2016.
98 ILO: *World Social Protection Report 2017–19* (Geneva, 2017).
99 A. N. Win: "Government to regulate ride-hailing mobile apps", in *The Myanmar Times*, 5 December 2017.

about the increasing market power of foreign companies due to their predatory price-setting capacity.[100]

V. What are the roles of social partners and the private sector in the strategies or policies specific to technological developments?

Information about the role of social partners in the formulation process of policies or strategies is lacking, although policy documents do show that space is accorded to the private sector to collaborate in efforts toward Myanmar's economic restructuring, especially in terms of advancing R&D, innovation, technological developments and human resource augmentation. Developing a nexus between the Government, the private sector and educational institutions is a policy objective that is featured in both the Myanmar Sustainable Development. Plan and the Industrial Policy.

The Government has started introducing regulatory reforms to allow greater participation of the private sector in education and skills-training service provision. The Myanmar Investment Commission, under Notification 7/2018, authorized the full ownership of private educational institutions, including technical, vocational and training institutions, by foreign investors.[101] This reform is already understood to have encouraged the establishment of some new private educational institutions.[102]

New Zealand

I. Does the country have a specific strategy or plan for advancing on technology-driven growth, including Industry 4.0?

There is no specific strategy or policy in New Zealand that mentions I4.0 or the 4IR as its focus. However, under the area of innovation, the Government of New Zealand has several initiatives and action plans in place to shape and drive the country's digital transformation.

Some of the initiatives and action plans pertaining to digital transformation are summarized in the report, "**Building a digital nation**", launched in March 2017 by the Ministry of Business, Innovation and Employment and defining the country's digitalization strategy.[103] The report describes the vision of a country that is an "adaptive and prosperous leading Digital Nation – a nation with a thriving digital sector, where our businesses, people and government are all using digital technology to drive innovation, improve productivity and enhance the quality of life for all New Zealanders". In terms of digital transformation, the report outlines four areas of action: digital sector, digital businesses, digital New Zealanders, and digital government. For each of these areas, an action plan is defined with a number of projects and responsible agencies.

A **Digital Skills Forum** was set up as part of activities related to "Building a digital nation". The Forum is a coalition of industry associations and government organizations that work together to identify key skills issues and opportunities across the ICT, high-tech and digital sectors. The Forum published a report

100 A. N. Win: "Squeezed by foreign competition, local taxi companies plead for help", in *The Myanmar Times*, 9 November 2018.
101 Myanmar Investment Commission: "Notification 7/2018". Available at: https://www.dica.gov.mm/sites/dica.gov.mm/files/document-files/notification_7–2018_eng-pdf.pdf [accessed 15 February 2019].
102 Oxford Business Group: "Myanmar to boost skills-based education through private investment", in *Borneo Post Online*, 23 December 2018.
103 Ministry of Business, Innovation & Employment, Government of New Zealand: *The business growth agenda: Building a digital nation – Part of BGA building innovation*, 2017.

entitled "Digital skills for a digital nation" in August 2018, providing an analysis of the status quo of the digital skills landscape in New Zealand and some policy recommendations.[104] Another related activity is the **Internet of Things Alliance**,[105] formed in 2017 between business, academia and government institutions. The Alliance is intended to provide a forum to improve understanding of the benefits and challenges of the Internet of Things, including issues related to cyber security.

There is also a **Digital Economy and Digital Inclusion Ministerial Advisory Group** that provides the Government with advice on the digital economy and eliminates digital divides. It is supposed to discuss questions related to the current state of the ICT sector and ICT capability, possible future scenarios, necessary actions required to achieve an optimal future state and a blueprint for digital inclusion and enablement. The Advisory Group first met in March 2018 and includes representatives from central and local Government, NGOs, the ethnic minority Māoridom, and industry and community groups.

The **AI Forum** operates as an NGO and was founded as an association in 2017.[106] It brings together New Zealand's community of artificial intelligence technology innovators, end users, investor groups, regulators, researchers, educators, entrepreneurs and interested persons to work together to find ways to use artificial intelligence to help enable a prosperous, inclusive and thriving future. It partners with business, academia and government institutions.

In order to shape its work agenda on the Future of Work, the Government established a **Future of Work Tripartite Forum**, which convened for the first time in August 2018. The Forum consists of government and businesses represented by Business NZ[107] and trade unions represented by the Council of Trade Unions. The Forum's work is supposed to feed into current government efforts as well as private sector work programmes. In principle, all four themes discussed by the Forum are related to new technological developments. These themes are: just transitions, learning for life, technology, and workplace productivity.

II. How does the strategy link to broader strategies/plans for industrialization and economic restructuring?

Further to the aforementioned specific policy measures, the Government, under its policy priorities highlighted in the Budget Policy Statement 2019, has also placed emphasis on leveraging digital and technological innovations to advance socioeconomic opportunities for all while "ensuring that no one is left behind".[108] Indeed, one of the five key priorities of the Budget Policy Statement includes, "supporting a thriving nation in the digital age through innovation, social and economic opportunities". Another broad policy framework that relates to innovation-led growth is the **Business Growth Agenda 2017**, launched in July 2017 by the Government.[109] This Agenda provides an update to the first Business Growth Agenda, which was launched in 2012. According to the Government, building a more competitive and productive economy is a key priority. The updated Agenda "drives this by ensuring the Government stays focused on what matters to business, to encourage confidence and further investment". The Business Growth Agenda defines six key areas in which the Government is striving for progress, which include investment, export markets, innovation, skilled and safe workplaces, natural resources, and infrastructure.

III. How does the country seek to prepare the labour market for the Fourth Industrial Revolution (4IR)?

The Building a Digital Nation report includes several references to labour-related policies. Digital technology is seen as a factor that is driving employment growth. It is also recognized, however, that digital innovation, including automation and artificial intelligence,

104 New Zealand Digital Skills Forum: *Digital skills: For a digital nation*, 2018.
105 New Zealand IoT Alliance portal: https://iotalliance.org.nz.
106 AI Forum New Zealand web portal. Available at: https://aiforum.org.nz/.
107 Business NZ is the country's largest business association.
108 Government of New Zealand: *Budget Policy Statement 2019*, 13 December 2018.
109 Government of New Zealand: *The Business Growth Agenda 2017* (Wellington).

has a disruptive effect on the labour market, destroying some jobs while creating others, thus requiring the flexibility of workers to adapt through lifelong upskilling and reskilling.

In this context, the report lists a number of skills policies. The "Action Plan for supporting a thriving digital sector", emphasizes the building of a "digital skills workforce". The policy measures in this action plan mention the activities of the Digital Skills Forum, a business-led and government-supported initiative to bring together industry associations and government agencies to identify and address issues and opportunities regarding the access and development of skills for the digital technology sector. The Forum is also tasked to map trends and future skills to meet the requirements of the digital sector and identify specific skills gaps that are likely to appear in the future. It will explore the adoption of a shared framework for describing, growing, assessing and managing competencies for ICT and digital technology professionals. Other skills policy measures are specifically related to the gap in cyber security skills, which will be addressed through the establishment of a public-private taskforce, providing actions to increase the number of cybersecurity professionals.

The strategy also aims to use migration policies to bring digital skills into the country. More specifically, it looks at exploring the use of a skills-based approach for the Long Term Skill Shortage List and the Skilled Migrant Category for ICT occupations. Within the admission procedure to the above two migration schemes, the idea would be to replace the requirement to provide evidence of the formal qualification with a demonstration of the skills and ability to do the job. Another measure is the facilitation of the process to become an Accredited Employer, which is the status an employer is required to have to recruit migrants.

In terms of enterprise policies, the action plan for supporting technology-enabled digital businesses includes the encouragement of a better use of digital technologies by small businesses to improve national productivity. As policy measures, the action plan refers to the engagement of SMEs around the opportunities of digital technologies, the assessment of the digital maturity of SMEs as well as SME confidence and capability building measures, supporting them to digitalize their operations. The action plan also talks about the development of digital skills and support for greater business connectivity.

With regards to non-discrimination, the action plan for developing connected and confident digital New Zealanders includes some policies that aim to support under-represented groups enter the digital technologies sector. As concrete policy measures, the action plan foresees the exploration of opportunities to encourage women into the digital technology sector through a return-to-work scheme following a career break. It also includes the objective to create high-value jobs for the ethnic minority Māori in digital technologies through a Māori Digital Technology Development Fund. Moreover, the action plan foresees, among other initiatives, research on the impacts of digital inclusion on the social and economic outcomes of the population.

IV. How does the government foresee protecting workers who are potentially affected by technological disruption?

The Building a Digital Nation strategy explicitly recognizes the potentially disruptive effect of new technologies on workers. It foresees dealing with those effects by incentivizing workers to upskill and reskill continuously throughout their lives. Skills policies thus play a key role to protect workers from technological disruption.

The Budget Policy Statement 2019 acknowledges that rapid technological advancements are set to have profound impacts on the labour market with many jobs predicted to be significantly altered and completely new jobs, non-existent today, set to emerge in the future.[110] Against such a backdrop, the Government identifies the need to "support businesses to undertake research and development, and provide workers with the foundational skills they need to adapt". It also points towards the notable digital divide and digital exclusion that exist in the country across social, economic and spatial demographic lines

110 Government of New Zealand: *Budget Policy Statement 2019*, op cit.

and affirms the Government's commitment to making the digital age work for everyone. Moreover, New Zealand has an unemployment benefits system that provides benefits to the unemployed regardless of the reason for unemployment. New Zealand citizens and permanent residents are entitled to apply to this scheme. Immigrants have to wait for one year before they are eligible for unemployment benefits, while those that resigned from previous jobs or were dismissed are eligible after 13 weeks.

Are labour standards addressed in relation to planning for new technological developments?

Labour standards are not explicitly addressed in relation to planning for new technological developments.

How is the country approaching the issue of digital labour platforms?

The ride-sharing app Uber has been the subject of intense discussions in New Zealand. The Government now requires Uber drivers to hold a Passenger Endorsement card as well as a Certificate of Fitness and a Small Passenger Service License Label for their vehicle.[111] Regulatory changes in this respect were introduced in October 2017 through the Land Transport Amendment Bill.[112] Drivers also need to comply with working-time related rules with working time recorded through an app. There are certain provisions regulating the number of hours, after which drivers are required to take breaks or a rest period. Uber drivers have been taken to court for not complying with the regulations.[113]

V. What are the roles of social partners and the private sector in the strategies or policies specific to technological developments?

Trade unions are not explicitly mentioned in New Zealand's Building a Digital Nation strategy. In contrast, business plays a key role, which is not surprising given that the strategy is an integral part of the Business Growth Agenda. The strategy aims to provide the inputs that "businesses need to succeed, grow and add jobs". Businesses are also well represented in the different alliances and forums that came into existence as part of or in addition to the digital nation strategy, such as the Digital Skills Forum, the Internet of Things Alliance, the Artificial Intelligence Forum and the Digital Economy and Digital Inclusion Ministerial Advisory Group.

111 See Uber: "Get authorised, New Zealand Regulations", undated. Available at: https://www.uber.com/en-NZ/drive/auckland/get-a-license/ [accessed 4 June 2019].
112 T. Nichol: "Uber drivers toeing the line after law changes around passenger licenses", in *NZHerald*, 11 January 2018.
113 S. Plumb: "Uber drivers taken to court by NZTA", in *NZHerald*, 7 November 2016.

Philippines

I. Does the country have a specific strategy or plan for advancing on technology-driven growth, including Industry 4.0?

The Philippines has adopted the **Inclusive Innovation Industrial Strategy (i³S)** (2017) as a roadmap to propel itself forwards as a globally competitive and innovation-driven economy.[114] Although the strategy does not specifically discuss how the Philippines will adapt to and adopt the new technologies and production processes associated with Industry 4.0, it seeks to drive innovation in all three sectors of the economy – agriculture, industry, and services – while also strengthening their backward and forward linkages with both local and global value chains.

The strategy is based on the following five pillars:

- Building new industries, clusters, and agglomeration;
- Capacity-building and human resource development;
- MSME growth and development;
- Innovation and entrepreneurship; and
- Ease of doing business and investment environment.

The i³S prioritizes the development of 12 select industries: automotive; electronics and electrical manufacturing; chemicals; shipbuilding and repair; aerospace parts and aircraft maintenance, repair and overhaul; tourism; IT-business process management and e-commerce; furniture, garments, and creative industries; iron and steel, tool and die; agribusiness; construction; and transport and logistics.

II. How does the strategy link to broader strategies/plans for industrialization and economic restructuring?

The i³S links closely with the **Philippine Development Plan (PDP) 2017–2022**.[115] According to the Department of Trade and Industry, the i³S focus on developing a competitive and innovative economy runs parallel to the PDP's vision for promoting innovation-led development. All of the five aforementioned pillars of the i³S link up with the objectives laid down in the PDP under various thematic strategies. Broad linkages can also be drawn to **Ambisyon Natin 2040**, the Philippines' long-term national vision.[116]

The **Comprehensive National Industrial Strategy** (2013) calls for an upgrading of selected industries that generate employment and deepening industry participation in global value chains. It overlaps with the i³S strategy in its promotion of innovation and R&D activities and expectation for upgrading and transforming industries.[117] Another flagship programme promoting innovation for economic diversification is the Department of Information and Communications Technology's **digitalPH**. The programme is intended to encourage innovation in the field of digital and multimedia technologies and services, especially in rural areas.[118] It consisted of various programmes, including the New Wave Cities project that seeks to encourage the Information Technology – Business Process Management (IT-BPM) sector to spatially diversify, extending the reach beyond the Metro Manila region, and the seedPH programme that aims to foster local start-ups and promote IT-based entrepreneurship,

114 Department of Trade and Industry, Government of the Philippines: *Philippine Inclusive Innovation Industrial Strategy (i3S): Propelling jobs, investments, and shared prosperity for all*, Policy Brief Series No. 2017-05, 2017.
115 National Economic and Development Authority, Government of the Philippines: *Philippine Development Plan 2017–2022 abridged version*, 2017.
116 National Economic and Development Authority, Government of the Philippines: "About Ambisyon Natin 2040", web portal. Available at: http://2040.neda.gov.ph/about-ambisyon-natin–2040/ [accessed 1 May 2019].
117 Department of Trade and Industry and Board of Investments, Government of the Philippines: *Comprehensive National Industrial Strategy*, 2013.
118 International Telecommunications Union: "digitalPH", ITU Telecom World '19 webpage: https://telecomworld.itu.int/exhibitor-sponsor-list/digitalph/ [Accessed 14 May 2019].

especially among Filipino youth.[119]

III. How does the country seek to prepare the labour market for the Fourth Industrial Revolution (4IR)?

One of the major areas that both the i³S and PDP address in seeking to prepare the labour market for the technological disruptions across industries is to better equip workers with the new skills required in the changing world of work. For example, the PDP, under the objective of expanding opportunities in agriculture, forestry and fishing, aims to increase the capacity of smallholder farmers and fisherfolk to adopt and better use new technologies. Similarly, under the objective of expanding opportunities in industry and services, the PDP seeks to improve access to technology for MSMEs. This is an objective that is also prioritized by the i³S.

More broadly, policies are aimed at developing strong and competent human resources who can adapt to the technological disruptions in various industries. The PDP focuses on policy actions such as: equipping the workforce with "21st century skills and competencies" and providing access to quality TVET opportunities that will help workers to remain relevant in the labour market. Capacity building and human resource development is one of the five pillars of the i³S, with a strategy that seeks to prepare the workforce for an innovation-led competitive economy by designing training and human resource development programmes to upskill workers. Creating a pool of human resources who possess skills sets required for future industries and who can drive the country's innovation-led growth strategy thus ranks as a top government priority. In addition to upskilling and reskilling domestic workers, the policy documents also point to the need for a labour mobility regime that would enable competent professionals from abroad – particularly in STEM fields – to further R&D and human resource training in the Philippines. The i³S also seeks to attract more foreign investments under its first pillar of "building new industries, clusters, and agglomeration", especially with a view to promoting technology transfers.

The policy objective of investing in the extension of R&D is a natural complement to developing human resources and equipping them with skills, including in new technologies. The PDP and i³S place great importance on this issue. Both seek to create a nexus between the Government, industry and academia in order to drive market-oriented research and encourage universities to undertake research that is relevant to industries. Moreover, expanding and extending international collaboration in science, technology and information fields to promote knowledge and expertise-sharing and potentially harnessing the expertise of the large Filipino diaspora to advance the innovation-led growth strategy also forms a part of the Government's plans to respond to rising technological disruption across industries.

In order to realize technology and innovation-driven growth, it is important to create a conducive environment for R&D, and the Philippines has plans to use incentives to such an end. The i³S points to financial incentives such as tax credits and accelerated depreciation as well as options for shared facilities for prototyping and demonstration to reduce R&D costs. As a step further, the PDP seeks to promote the commercialization of technologies developed as a result of research funded by public and private entities while at the same time creating a vibrant entrepreneurship ecosystem characterized by a culture of intellectual rights' protection to further incentivize R&D. Additionally, by providing support to the R&D agenda through mechanisms such as increased funding, the Philippines seeks to improve overall technological development, acquisition and adoption. It also plans to enable start-ups in science, technology and information to find their feet by creating opportunities to pool investments from the private sector and other innovative financial mechanisms.

119 See: IT & Business Process Association of the Philippines: *Next Wave Cities Report 2016*; and Department of Information and Communications Technology, Government of the Philippines: SEED.PH, web portal. Available at: https://dict.gov.ph/e-business/seed-ph/ [Accessed 14 May 2019].

IV. How does the government foresee protecting workers who are potentially affected by technological disruption?

The specific issue of technological unemployment and measures to address it does not feature prominently in vision documents such as the PDP and the i³S. In fact, apart from technologically oriented sectors such as the IT-BPM sector, the i³S also focuses on the promotion and development of labour-intensive sectors such as tourism, other services allied to manufacturing like design and maintenance, logistics and infrastructure investments, ship building and maintenance, and aircraft overhaul, among others.[120] The development of all of these industries, guided by the five pillars of the i³S, is expected to drive job-rich growth.

The PDP includes one objective of improving employability under the strategy of inequality-reducing transformation. It points towards the need to strengthen public employment services and expand opportunities for internships, apprenticeships and training programmes to improve worker employability. Furthermore, it underscores the importance of continuous skills-upgrading and reskilling, but again, not in specific reaction to potential technological restructuring.

One of the clearest examples of state action towards protecting workers affected by technological disruption is the incorporation of clauses on unemployment protection in the revised **Social Security Act 2018**.[121] Under the legislation, workers who are members of the Social Security System who involuntarily lose their jobs will be entitled to up to 50 per cent of their average monthly salary for up to two months. Prior to this legislation, only government employees were entitled to the unemployment benefit programme under the **Government Service Insurance Act**.[122] An important link to this can be found under the strategy on accelerating human capacity development in the PDP, which highlights the Government's vision to create income safety nets for vulnerable and displaced workers through emergency employment and unemployment insurance programmes. The strategy also lays down the Government's commitment to enhancing the efficacy of the minimum wage policy.

Additionally, there are certain emergency employment mechanisms in place that are generally deployed in the aftermath of natural disasters and extended to vulnerable, displaced workers. For example, the Department of Labour and Employment's **Integrated Livelihoods and Emergency Employment Program** provides vulnerable, displaced and unemployed workers with short-term employment at the minimum wage, accident, health insurance, safety and health orientation, and access to scholarships.[123] Mechanisms like these could provide a model for temporary relief for workers who are affected the most by technological disruptions in certain tech-intensive industries.

The Philippines also has an active labour market policy regime in place that works at both the national and local levels. Various initiatives operated by government agencies, line ministries and educational institutions provide assistance to displaced workers in various forms including, but not limited to, skills-training, job search and scholarships. At the local level, there are public employment service offices that organize various employment facilitation activities such as job fairs, livelihood and self-employment seminars, among others, and are maintained by local government units, state universities and colleges, and non-governmental organizations or other community-based organizations.[124] Additionally, there are some other specific programmes such as the Job-Bridging Internship Program operated by the Technical Education and Skills Development Authority that provide job-seekers with skills for employment training services.[125]

120 Department of Trade and Industry, Government of the Philippines: *Philippine Inclusive Innovation Industrial Strategy (i3S)*, op cit.
121 The Social Security Act 2018 came into effect on 26 November 2018.
122 ILO: "Philippines country profile", Social Protection Platform, updated 8 September 2015.
123 ILO: *DOLE's Integrated Livelihood and Emergency Employment Program*, Philippines, Country Note Series (Geneva, April 2015).
124 Department of Labor and Employment, Bureau of Local Employment, Government of the Philippines: "About PESO", web portal. Available at: http://www.ble.dole.gov.ph/index.php/porgrams-projects/2013-12-16-01-22-48 [accessed 4 June 2019].
125 Asian Development Bank: *Labour Market Programs in the Philippines*, Facilitating Youth School-to-Work Transition Program, Subprogram 1.

This review did not, however, come across public employment service programmes or other forms of active labour market policies that specifically address the challenges of workers displaced as a result of technological disruptions in various industries.

Are labour standards addressed in relation to planning for Industry 4.0 and/or economic restructuring plans?

The PDP addresses a number of labour standards subjects such as child labour, employment policy, minimum wage policy, occupational safety and health, and maternity and paternity leave in laying out the vision for the country's economic and social development. However, the i^{3}S strategy in itself does not directly address labour standards in relation to planning for Industry 4.0.

Some concrete steps, however, have been taken toward addressing labour standards in relation to the evolving working arrangements aided by technological changes. For example, in 2018, legislation concerning the protection of telecommuting workers' rights was passed. The **Republic Act No. 11165 (Telecommuting Act)** of 2018 paves the way for employees in the private sector to work from home through the use of "telecommunications technologies and/or computer technologies".[126] The law permits employers to offer the option of telecommuting to its employees provided that the terms and conditions of engagement respect the minimum labour standards that are set by law, including on compensable working hours, leave entitlements, rest days, minimum working hours and overtime. The new law thus provides telecommuting workers the same rights, protection, and compensation as those who work in traditional onsite work premises.

How is the country approaching the issue of digital labour platforms?

The i^{3}S does not highlight the Government's vision with regards to the governance of digital labour platforms-based businesses. However, there are certain businesses, primarily ride-hailing services, that operate in the Philippines and for which the Government has made necessary legal provisions.

The operation of ride-hailing services such as Uber and Grab in the Philippines has been facilitated by the creation of a new category of transport service providers, namely "transportation network companies". The Department of Transportation and Communication borrowed the definition of transportation network companies from the California Public Utilities commission, defining it as an "organization whether a corporation, partnership, sole proprietorship, that provides pre-arranged transportation services for compensation using internet-based technology application or digital platform technology to connect passengers with drivers using their personal vehicles". The department order that put in the regulatory mechanism for the operation of transportation network companies highlights a number of rules that need to be complied with by the "transportation network vehicle service". However, it does not define the employment relations between the driver and transportation network companies.[127]

Regarding non-location-based platform work, also known as crowdwork or freelancing, the Philippines is reported to have one of the world's largest share of "gig" workers per capita (2 per cent of the Filipino population) according to a global study conducted by Pay Pal.[128] Recognizing the growth of crowdwork and the need to offer greater protection, particularly from late or non-payment for services rendered, a "Freelancers Protection Act" (Senate Bill No. 351) was proposed for consideration by the Senate in July 2016.[129] The bill under consideration would outline rules on contracts for freelance work, the steps whereby online workers can file complaints against employers, fix penalties for non-payment of services and make freelance workers exempt from tax payment in their first three years. As of May 2019, the bill is still pending. While an important step to regulating crowdwork, it

126 Congress of the Philippines: *Republic Act No. 11165, An Act institutionalizing telecommuting as an alternative work arrangement for employees in the private sector*, 23 July 2018.
127 Department of Transportation and Communications, Government of the Philippines: Department Order No. 2015-011 (2015). Available at: https://dotr.gov.ph/images/issuances/DO/2015/DO2015-11.pdf [accessed 19 March 2019].
128 PayPal: "PayPal Global Freelancer Survey", 1 March 2018.
129 H. Torregoza: "Aquino files bill on protection, incentives for freelance workers", in *Manila Bulletin*, 25 March 2019.

remains unclear how the legislation would be enforceable across national borders.

On May 1, 2018, the President issued **Executive Order No. 51** on the security of tenure, ending illegal contracting and subcontracting practices within the context of the existing labour code.[130] While there are no explicit mentions of online-based work or digital labour platforms in the Executive Order, it could nonetheless have important norm-setting implications with regards to regulating work and protecting workers in the digital sphere.

Recognizing the increasing decline of collective bargaining coverage rate in the country and the exclusion of non-standard workers from the traditional mechanism of social dialogue, the government also embarked on a review of policies on the implementation of multi-employer/multi-union, or industry-based collective bargaining. The review recognized the emerging challenges characterized by the increasing prevalence of non-standard forms of work, including digital labour platforms, and is seeking solutions to promote inclusive collective bargaining. In the meantime, there is an enabling policy for allowing "multi-employer bargaining".[131] To date, however, the application of multi-employer bargaining is limited.

V. What are the roles of social partners and the private sector in the strategies or policies specific to technological developments?

The role of the private sector and academia is most pronounced in the promotion of R&D and the preparation of human resources to narrow the skills gap in order to help achieve the vision set forth by both the PDP and the i^{3}S.

Through collaboration with the Government, the private sector and academia are encouraged to undertake market-oriented research and go one step further, commercialize the technologies developed as a result of such collaboration. In order to create an innovation-friendly ecosystem, the Government also encourages the use of shared facilities between the Government, academia and industries for rapid prototyping and demonstration of new technologies. It is not clear to what degree trade unions were included in the consultative process or in the strategies' implementation.

130 The President of the Philippines: *Executive Order No. 51 Implementing Article 106 of the labor code of the Philippines, as amended, to protect the right to security of tenure of all workers based on social justice in the 1987 Philippine constitution*, 2018.

131 DOLE Department Order No. 40, series of 2003 (DO 40, 2003), specifically Rule XVI, Section 5.

Singapore

I. Does the country have a specific strategy or plan for advancing on technology-driven growth, including Industry 4.0?

While Singapore does not have a specific Industry 4.0 strategy, there are numerous initiatives that link to maximizing the nation's potential as a global leader in producing and using new technologies. One such effort is the Ministry of Trade and Industry's Industry Transformation Programme, supported with a budget of 4.5 billion Singapore dollars.[132] Under the programme, 23 industries were targeted under six clusters,[133] which together cover as much as 80 per cent of the country's GDP. The Council for Skills, Innovation and Productivity, a tripartite body, was given overall responsibility for the composition of Industry Transformation Maps. Each Map was tailored to the needs of the industry, devising initiatives to raise productivity, develop skills, drive innovation and promote internationalization in order to catalyse transformation and achieve the stated vision of each industry. These will be refined over time to ensure relevancy. As of January 2018, 1.7 billion Singapore dollars had been spent for Industry Transformation Maps, with the funds primarily spent on supporting fledgling enterprises and financing industry transformation projects.

New technological developments are at the very heart of Singapore's long-term strategy, **Smart Nation**,[134] launched in November 2014. The strategy defines "smart nation" as a "Singapore where people will be more empowered to live meaningful and fulfilled lives, enabled seamlessly by technology, offering exciting opportunities for all". The strategy is continuously updated, with the latest update undertaken in November 2018. The time horizon of Smart Nation is open in the sense that no specific date has been set for achieving the Smart Nation vision.

II. How does the strategy link to broader strategies/plans for industrialization and economic restructuring?

Singapore's Smart Nation strategy is made up of three integral pillars: Digital Economy, Digital Government and Digital Society. Numerous associated strategies and programmes are emerging.

The Digital Economy blueprint labelled **Digital Economy Framework for Action**[135] was introduced in May 2018 by the Minister for Communications and Information. It sets out the motivation for focusing on the digital economy ("The Digital Imperative"), defines related challenges and opportunities ("Framing a World-Leading Digital Economy") and proposes actions for companies, workers and communities ("Taking Action in a Digital Economy of New Opportunities") in response to those challenges and opportunities.

In June 2018, the Singaporean Government launched the Digital Society blueprint labelled **Digital Readiness Blueprint**.[136] It emphasizes the importance of "digital readiness" and defines four strategic thrusts as well as ten policy recommendations that map into those thrusts. The policy recommendations focus on expanding and enhancing digital access for inclusivity, infusing digital literacy into national consciousness, empowering communities and businesses to drive widespread adoption of technology, and promoting digital inclusion by

132 ESCAP (2019) makes reference to additional "frontier technology-related policies and policy objectives" in the country that are delineated by specific outcome areas, e.g. infocomm media; research, innovation and enterprise; and cyber security. For a more detailed picture see ESCAP: *Evolution of science, technology and innovation policies for sustainable development: The experiences of China, Japan, the Republic of Korea and Singapore* (Bangkok, 2019).

133 The six clusters are manufacturing; built environment; trade & connectivity; essential domestic services; modern services; and lifestyle. Ministry of Trade and Industry, Government of Singapore: "Media fact sheet on Industry Transformation Maps", September 2016.

134 See the Smart Nation web portal. Available at: https://www.smartnation.sg/ [accessed 17 June 2019].

135 Infocomm Media Development Authority: "Digital Economy Framework for Action", web portal. Available at: https://www2.imda.gov.sg/programme-listing/digital-economy-framework-for-action [accessed 17 June 2019].

136 Ministry of Communications and Information, Government of Singapore: "Digital Readiness Blueprint", web portal. Available at: https://www.mci.gov.sg/en/portfolios/digital-readiness/digital-readiness-blueprint [accessed 17 June 2019].

design. The document was developed through collaboration between the Government, the private sector and the so-called "people's sector", comprising a number of civil society organizations.

In June 2018, Singapore launched the **Digital Government Blueprint**,[137] which is an e-government initiative that consists of a strategy defined around six objectives. These are: the integration of services around citizen and business needs; the strengthening of the integration between policy, operations and technology; the building of common digital and data platforms; the operation of reliable, resilient and secure systems; the raising of digital capabilities to pursue innovation; and the co-creation with citizens and businesses and facilitation of technology adoption. The strategy also sets clear and measurable key performance indicators and milestones to be achieved by 2023.

Another government tool designed to support companies is the **Smart Industry Readiness Index**.[138] The Index was launched in November 2017 by the Singapore Economic Development Board, with inputs from an advisory panel of experts from industry and academia. A global test, inspection, certification and training company had the role of project manager and technical advisor. The Index is based on a reference model developed by the German Industry 4.0 network "Plattform Industrie 4.0", and was refined through piloting programmes with Singapore-based enterprises of different sizes and types of manufacturing activities. The Smart Industry Readiness Index"offers a systematic approach for companies to start, scale, and sustain their transformation initiatives", regardless of their starting point.

The key target group for the Index are manufacturing sector companies, the aim being to equip them with knowledge about the benefits, maturity levels and fields of improvement in relation to Industry 4.0. The Index includes three fundamental building blocks of Industry 4.0: Process, Technology and Organization. These map onto eight pillars of focus, which in turn map onto 16 assessment dimensions, which companies can use to evaluate their own facilities. "With the Index, companies have the opportunity to take decisive action today by following the four steps in the LEAD framework – to set themselves on the right trajectory for transformation and growth."

Also in support of maximizing the potential of smart manufacturing, the Agency for Science, Technology and Research in August 2017 launched a report on the "**Future of Manufacturing Initiative**".[139] The report was the result of a Steering Committee made up of representatives from higher learning institutes, economic agencies and industry, and was offered as a strategic plan for Singapore's manufacturing sector in the framework of the **Research, Innovation and Enterprise 2020 Plan**. The document includes three policy recommendations: the creation of public-private partnership platforms to drive technology innovation, knowledge transfer and adoption; investment in R&D programmes that create capabilities in disruptive technologies; and the building and raising of awareness on industrial standards in manufacturing.

III. How does the country seek to prepare the labour market for the Fourth Industrial Revolution (4IR)?

The Digital Economy Framework for Action portrays technological change very positively and with great optimism, referring in several instances to new and more fulfilling and meaningful jobs that are being created with automation and helping to increase limited human resources. Skills policies play a key role and workers in all sectors are reminded of the need to be open to continually learn, reskill and upskill themselves to fulfil the needs of the digital economy.

Singapore aims to be a "hub for digital talent" and the principal mechanism for ensuring that skills needs are met is through the operations of the **SkillsFuture Initiative** under the leadership of the Future Economy Council. The Council is

137 Government Technology Agency, Government of Singapore: "Digital Government Blueprint", web portal. Available at: https://www.tech.gov.sg/digital-government-blueprint/ [accessed 17 June 2019].
138 Singapore Economic Development Board: "The Singapore Smart Industry Readiness Index", News item, 22 March 2018.
139 Agency for Science, Technology and Research: Report on Future of Manufacturing Initiative, Submitted to the Future of Manufacturing Steering Committee, August 2017.

chaired by the Minister for Finance and consists of members from the Government, industry, unions and educational and training institutions.

Within each of the Industry Transformation Maps, recommendations on skilling and reskilling were made over the course of 2018 to meet the training needs in each of the 23 sectors. The operationalization of the Maps continues under the oversight of the now renamed Council for Skills, Innovation and Productivity, the Committee on the Future Economy. The Future Economy Council is responsible for the implementation of the recommendations.

The Digital Economy Framework for Action refers to skills in the context of the SkillsFuture programme, which includes the **TechSkills Accelerator initiative**. This initiative aims to narrow the widening "Infocomm media" human resources gap, which corresponds to the gap between the demand for and supply of ICT workers. The gap is envisaged to narrow though continuous training and placement efforts for Infocomm media professionals. At the same time, training efforts for existing Infocomm media professionals, especially in SMEs, will be scaled up through upgrading and reskilling programmes. Much importance is also attached to the general need for the digital fluency of all workers, which is to be achieved through skills policies. In addition, the **SkillsFuture for Digital Workplace** programme aims to equip the population with digital skills, and the **SkillsFuture Series** helps to equip working adults with skills in eight priority and emerging skills areas, including data analytics, cybersecurity and digital media.

The Digital Readiness Blueprint picks up on this general need and emphasizes the importance for all Singaporean citizens to not only have access to digital technologies but also to be equipped with digital skills that allow for a safe use of these technologies. The Blueprint, moreover, focuses on skills, stressing the need for the Government to have a "digitally confident workforce" in place. Government employees are promised support for upskilling efforts. Training in broad-based ICT skills are also considered to be key in the Digital Government Blueprint.

The **Future of Manufacturing Initiative** refers to the importance of skills and a higher skilled workforce to boost productivity in manufacturing without, however, providing concrete policy recommendations that would directly relate to that policy area.

Technological change is viewed to be highly beneficial for Singapore also in the Smart Industry Readiness Index that equally focuses on the manufacturing sector, with positive effects expected on wages. The document that describes the Smart Industry Readiness Index mentions as an expected impact of Industry 4.0 by 2024, a "50 per cent increase in salaries for the 22,000 new jobs created" and a "30 per cent increase in labour productivity".

The policies that are recommended to enterprises within the Smart Industry Readiness Index are, however, policies that, at the enterprise-level, focus on cost minimization, including labour costs. Within the Operations pillar of the Process building block, the index states explicitly that the "end goal is to convert raw materials and labour into goods and services at the lowest cost". The Smart Industry Readiness Index hence takes an enterprise perspective as opposed to a broader social perspective, with an apparent disconnect between the objectives defined at the enterprise level and the expected positive impact on wages.

IV. How does the government foresee protecting workers who are potentially affected by technological disruption?

Skills policies play a central role when it comes to supporting workers who are adversely affected by technological disruption. Displaced workers and those at risk of displacement will be supported through "a plethora of courses and programmes aimed at helping these workers gain new skills and improve their employability". The Government has already instituted skills training and placement schemes for professionals starting out or changing jobs mid-stream, the largest of which is the Workforce Singapore's **Professional Conversion Programme** (PCP). This programme, started in 2016, places professionals, managers, executives and technicians in growth sectors, where their on-the-job training takes place. It ties in with the broader Workforce Singapore

Adapt and Grow initiative, which is also closely linked to the SkillsFuture initiative and the idea that lifelong learning can serve as a deterrent to labour market disruptions over the life cycle. According to a speech given by the Singaporean Minister of Manpower in April 2019, nearly 5,000 people were reskilled and placed into new jobs through more than 100 PCPs. At the same time, the Adapt and Grow Initiative has helped more than 30,000 workers to take up new jobs.[140]

Are labour standards addressed in relation to planning for new technological developments?

Labour standards are not explicitly addressed in relation to planning for new technological developments.

How is the country approaching the issue of digital labour platforms?

The Digital Economy Framework for Action talks explicitly about "catalysing digital platforms" by supporting digitalization efforts that benefit a large number of companies. Digital platforms, including labour platforms, are thus predominantly seen as an instrument for companies to become more competitive.

In Singapore, as elsewhere, there is an increasingly strong call for freelance jobs, including drivers in the ride-hailing industry, to be protected under the country's Employment Act. A parliamentary debate ensued in November 2018 regarding issues of the employment relationship of platform workers and on where the responsibility for worker protection and social protection rests.[141] For the moment, the issue remains legally undefined (as in most other countries of the world), but there have been occasions where the Manpower Ministry has been called upon to intervene in cases of disputes between freelancers and employers.

V. What are the roles of social partners and the private sector in the strategies or policies specific to technological developments?

All initiatives linked to the future of work in Singapore have been negotiated in a tripartite framework, with close involvement of the Singapore National Trades Union Congress and the Singapore National Employers Council and their members. The Future Economy Council, which is now intended to implement action towards the transformation of Singapore's economy for the future, is chaired by the Minister for Finance and comprises members from the Government, industry, unions and educational and training institutions.

140 A. Sharma Kalra: "Key updates from Minister Josephine Teo, SNEF and NTUC's May Day messages", in *HumanResources*, 30 April 2019.

141 K. Cheng: "Protect freelancers under the Employment Act, MPs urge", in *Today*, 8 May 2019.

Thailand

I. Does the country have a specific strategy or plan for advancing on technology-driven growth, including Industry 4.0?

In May 2016, the country formally adopted **Thailand 4.0**, a 20-year strategy to propel it forwards by addressing what are identified as Thailand's three major challenges: the "middle-income trap", the "inequality trap", and the "imbalance trap".[142] The document is a blueprint for transforming the country by leveraging innovation and new technologies to enable it to move up the value chain in existing industries such as affluent medical tourism, automotive industry, agriculture and biotechnology, electronics, and food and beverages, as well as to develop competency in new industries such as robotics, aviation and logistics, digital technologies, biofuels and biochemicals, and the health care and medical industry. The primary focus of the strategy rests on attracting more tech-intensive investments into the aforementioned strategic industries through the employment of various incentives, preparing the Thai labour force to adapt to, and thrive in, the innovation intensive economy that it envisions – albeit without specific timelines to achieve all of the ambitions laid out.

II. How does the strategy link to broader strategies/plans for industrialization and economic restructuring?

Thailand 4.0 is a strategy that directly complements the larger national plans such as the **12th National Economic and Social Development Plan (NESDP) 2017–2021** and the **Twenty-year National Strategy 2017–2037**, and is formulated in accordance with the **"Sufficiency Economy Philosophy"**.[143] The current five-year plan is seen as the first phase in the larger 20-year national vision that sets the deadline for Thailand's graduation into high-income status by 2037. A number of strategies within the 12th NESDP such as those on strengthening human capital, addressing persistent inequalities, promoting sustainable and environmentally responsible economic growth, promoting and advancing infrastructure development, and fostering science and technology-based research and innovations, among others, link closely with the objectives identified under the Thailand 4.0 vision. For example, the Eastern Economic Corridor, a flagship Thailand 4.0 project, stretches across three provinces and offers a range of financial incentives in order to promote investments, build human resources and spur innovation in targeted industries that further the larger goals of moving from the current Thailand 3.0, defined by heavy industries and advanced machinery, to Thailand 4.0, characterized by innovation-led manufacturing and services at the higher end of the value chain.[144]

III. How does the country seek to prepare the labour market for the Fourth Industrial Revolution (4IR)?

National planning documents such as the 12th NESDP and Thailand 4.0 have articulated the need to strengthen the country's human capital in order to attain their goals. Certain specific clauses in the 12th NESDP refer directly to the need to prepare the labour force for technology driven industry. For example, development guideline 3.5.3 sub-clause 2 under strategy 7 on advancing infrastructure logistics, underscores the need for "improving human resources in the public sector, private sector, and academia to be able to support the development of digital technology and to meet future labor demand of the digital economy". The document also highlights the need to increase the quantity as well as the quality of STEM graduates and indicates the Government's willingness

142 The "imbalance trap" refers largely to environmental challenges; Economist Intelligence Unit: "Thailand 4.0: In sight but not in reach", 16 November 2017; The Knowledge Management Institute Foundation: *Thailand 4.0*, 2017.

143 Office of the National Economic and Social Development Board, Office of the Prime Minister: *The Twelfth National Economic and Social Development Plan (2017–2021)*, 2016; The Knowledge Management Institute Foundation: *Thailand 4.0*, op cit.

144 Eastern Economic Corridor: "Background – Eastern economic corridor development", web portal. Available at: https://www.eeco.or.th/en/background [accessed 22 Jan. 2019].

to use financial incentives in order to attract skilled STEM workers into relevant "strategic" industries.

Furthermore, the 12th NESDP provides some insights into how the Government seeks to leverage technology in order to narrow the skills gap and the problems of access to certain services by a section of the population by engaging relevant stakeholders in the process. The "Distance Health Assistance Programme" under strategy 2 for creating a just society and reducing inequalities, for example, is a telemedicine initiative that uses technology to attempt to offset the shortage of health professionals in certain parts of the country. The project is jointly implemented by the Ministry of Digital Economy and Society, the Ministry of Public Health and certain public hospitals. Thailand 4.0 similarly features plans to provide remote and online learning opportunities.

Certain quantified targets have also been established with regards to upgrading workforce skills levels. For example, the 20-year National Strategy aims to produce more than 12,000 doctoral researchers to support the development of the ten industries identified under the Thailand 4.0 framework.[145] Similarly, the Thailand 4.0 document targets the quality upgrade of labour skills of up to 500,000 workers in five years in accordance with the development needs and direction of the country without further details as to how this is to be achieved. Ten "S-curve industries" are identified by the document as economic drivers, with the first five industries termed the "first S-curve" industries and the next five comprising the "new S-curve" industries.[146] The former group consists of industries for which there is already a strong domestic base but which will need continued R&D and innovation, such as next-generation automotive; smart electronics; affluent, medical and wellness tourism; agriculture and biotechnology; and food for the future. The latter group consists of industries such as robotics; aviation and logistics; biofuels and biochemicals; digital technologies; and medical services and technologies.

More generally, under Thailand 4.0, it is identified that for industrial and economic restructuring to proceed as planned and in order to prepare Thai workers for the future of work that is anticipated to increasingly be defined by non-routine and task- and project-based jobs, there is a need to upskill, reskill and multi-skill the workforce. Thailand 4.0 sets forth the Government's intention to facilitate such a change by setting up a system for education integration, training and career development in order to adjust to changes and define future life paths, with the following four goals:

1. Better informing people about their options for education, training and career development;
2. Developing the education system, training and skills development to meet the needs of the industrial sector;
3. Promoting professional path development based on skills and expertise; and
4. Creating a lifelong learning culture.

The Ministry of Labour is known to have developed a **Twenty-year Strategic Framework on Human Resource Development 2017–2036** in order to support the Thailand 4.0 initiative by strengthening the human capital of the nation's workforce.[147] The strategy, it is understood, is divided into four five-year phases with the first part (2017–2021) – aligning with the 12th NESDP – focusing on creating "productive" human resources by creating a conducive legislative and regulatory environment.[148] The next three phases are to focus on "brain power". The Ministry of Labour is also known to have cooperated with businesses and educational institutions to devise labour development projects that feature training courses in domains such as digital technologies, logistics, mechatronics, tourism and services, agricultural processing, electronics and telecommunications as well as a separate training course on green jobs.[149]

145 "Govt designs 20-year plan to churn out more researchers", in Bangkok Post, 20 August 2016.
146 The Knowledge Management Institute Foundation: Thailand 4.0, op cit.
147 Ministry of Labour, Government of Thailand: "Labour Ministry reiterates executives to drive action plan for Thailand 4.0", News release, 13 January 2017.
148 Ministry of Labour, Government of Thailand: "Workforce development excelled for Thailand 4.0", News release, 3 April 2017.
149 The Government Public Relations Department, Government of Thailand: "Government to push for Thai labor 4.0", News release, 31 May 2017.

IV. How does the government foresee protecting workers who are potentially affected by technological disruption?

The Ministry of Labour has stated that Thailand 4.0 will not result in high levels of unemployment and the Ministry, along with other related agencies, has worked towards measures to address such challenges should they arise.[150] The Ministry's 20-year Manpower Development Strategy reportedly seeks to prepare the workforce for Thailand 4.0 by creating an environment characterized by decent work, job security, safe working conditions, legal protection of workers and fair treatment in employment, skills development, and social protection.[151] Automation, in itself, is viewed as an important part of the larger strategy to advance higher in the manufacturing value chain. The 12th NESDP, under strategy 3 to "strengthen the economy and underpin sustainable competitiveness", has a flagship project called "Manufacturing Automatic and Robotics Institute" that aims to promote automation in manufacturing, especially in the automotive and electronics industries, with a view to raising productivity.

As far as the existing social protection mechanism vis-à-vis unemployment is concerned, the country has a contributory social insurance scheme in place. Under this system, in 2015, around 43.2 per cent of unemployed persons received unemployment benefits.[152] The country also has some active labour market policies in the form of public employment services that provide career guidance, job matching and skills development trainings.

Are labour standards addressed in relation to planning for Industry 4.0 and/or economic restructuring plans?

Labour standards are not explicitly addressed in relation to planning for new technological developments. Actions concerning the adoption and implementation of labour standards, however, have reportedly featured under the first phase of the Ministry of Labour's 20-year Manpower Development Strategy.

How is the country approaching the issue of digital business platforms?

Based on our review, Thailand has not made regulatory changes in order to address employment-related issues in the digital platforms. The Thailand 4.0 document also does not discuss or highlight the Government's plans on the governance framework for employment relations in the platform economy.

In Thailand, as in many countries, ride-hailing platforms have been at the centre of discussions on the platform economy. Services that allow passengers to hail personally owned vehicles that are not registered as public transport, i.e. a taxi, and that do not comply with the fares set by the Government are considered illegal as they violate laws such as the Motor Vehicle Act 1979.[153] These services, therefore, have been viewed as unfair competition from regular taxi drivers and have sparked tensions.[154]

150 Ministry of Labour, Government of Thailand: "Ministry of Labour revealed the policy of Thailand 4.0 does not make people unemployed and confirmed measures to support it", News release, 2 September 2018.
151 The Government Public Relations Department, Government of Thailand: "Manpower development strategy toward Thailand 4.0", News release, 6 January 2017.
152 ILO: *World Social Protection Report 2017–19* (Geneva, 2017).
153 A. Mahitthirook: "DLT to step up efforts against Uber and Grab", in *Bangkok Post*, 10 March 2017; "Uber petitions NLA for law amendment on ridesharing service", in *Thai PBS*, 19 July 2017; O. Jotikasthira: "Taxi network wants answers on Uber's legal status", in *Bangkok Post*, 24 January 2018.
154 "Cabbies told not to bully Uber", in *Bangkok Post*, 25 June 2017.

V. What are the role of social partners and the private sector in the strategies or policies that relate to new technological developments?

The role of the private sector features prominently in Thailand's bid to restructure its economy and move towards Thailand 4.0. The 12th NESDP indicates the Government's will to build bridges between educational and research institutions, the public and private sectors and civil society.[155] The Plan also highlights the importance of engaging the private sector in R&D as well as commercialization of innovative products and services. This is a theme that is also captured in the Thailand 4.0 document. Information about the role of social partners in the formulation process of policies or strategies is lacking.

Viet Nam

I. Does the country have a specific strategy or plan for advancing on technology-driven growth, including Industry 4.0?

Industry 4.0 has progressed from strategic planning to implementation in Viet Nam. The Directive No. 16 (Ct-Ttg) on **Strengthening Vietnam's capacity to leverage the 4th Industrial Revolution** was adopted on 4 May 2017. Implementation plans on the Directive have also since appeared for specific provinces but not yet at the national level.[156]

While Directive No. 16 sets the framework for the country to grasp the opportunities of the 4IR as a key component of future economic growth, the strategy that hones in specifically on the manufacturing sector, akin to an Industry 4.0 plan, is the **National industrial development policy until 2030 with a vision toward 2045** (Resolution No. 23-NQ/TW, March 2018). The policy sets 2045 as the deadline for Viet Nam's transformation into a modern, industrialized country, with the transformation to be based on policies that will promote the shift of the manufacturing base from dependence largely on natural resources and low-cost labour to a focus on high-tech and environmentally friendly resources.

The strategy is set out in two phases. The period up to 2030 aims for development of priority industries – some in the global supply chain with higher value-added and positive spill-over effects and some that are labour-intensive (with a continued focus on the textile, garments and footwear sectors) – and for building the ICT infrastructure needed to support a thriving 4IR in the country. The period 2030–2045 would prioritize the development of "new generations" of technologies.

155 Office of the National Economic and Social Development Board, Office of the Prime Minister: *The Twelfth National Economic and Social Development Plan (2017–2021)*, op cit.

156 Plans were found for Lam Dong, Dong Nai and Khanh Hoa provinces. It is possible that others exist but were not located in our search.

II. How does the strategy link to broader strategies/plans for industrialization and economic restructuring?

As of January 2019, the Government of Viet Nam has taken direct and multifaceted action to promote technological development as a driver of future economic growth.[157] The objective of the current Five-year Plan of the Ministry of Planning and Investment – the **Socio-economic Development Plan, 2016–2020** – is to "accelerate industrial restructuring, creating a foundation for industrialization and modernization" as a major solution under development task 2 ("Promote economic restructuring associated with growth model innovation, improving productivity, efficiency and competitiveness"). Similarly, the **Strategy for Science and Technology Development for the 2011–2020 period** and the **Plan on economic restructuring in association with conversion of the growth model towards improving quality, efficiency and competitiveness during the 2016–2020 period** (Decision No. 124/QD-TTg, February 2012) all focus on taking action to boost economic growth and grasping technological developments to reach the maximum potential of industrialization and high-income status.[158]

The Directive No. 16 (Ct-Ttg) on Strengthening Vietnam's capacity to leverage the 4th Industrial Revolution strategy is closely linked to the Government's industrial development strategy. The 4IR plan focuses on building an enabling environment to support high-tech entrepreneurship and technological start-ups, while upgrading skills either through the education and training system for current and future students or the training system for workers in shrinking sectors (e.g. agriculture). Directive No. 16 also highlights the opportunities for investing in digital and internet technologies and underscores that industrial production will be brought closer to advanced S&T. Implementation is expected to be cross-departmental, with tasks assigned to the Ministry of Information and Communications, the Ministry of Science and Technology, the Ministry of Education and Training, the Ministry of Labour, Invalids and Social Affairs, the Ministry of Finance and Viet Nam Academy of Science and Technology.

Another area linked to the 4IR is the Government's plans towards digitalization, including expansion of e-government systems. In May 2017, the Government issued **Decision No. 677/QD-TTg on approval of the scheme for developing a Vietnamese digital knowledge system**, led by the Prime Minister, and there are numerous other decrees and plans that link to promoting and regulating the digital economy.[159] The 4IR directive also calls for continued action on the numerous plans and action programmes linked to improving the business environment (e.g. Resolution no. 35/NQ-CP dated 16 May 2016 by the Government on business support and development up to 2020).

III. How does the country seek to prepare the labour market for the Fourth Industrial Revolution (4IR)?

Directive No. 16 assigns the following general tasks to the Ministry of Labour, Invalids and Social Affairs: (i) Revise education and vocational training in vocational training schools towards the development of human resources, change of career with appropriate skills in order to master technological advances of the 4IR; and (ii) research into and propose policies and remedial measures for minimizing the negative effects the revolution may have on the labour market and social security; report such to the Prime Minister. Such information gathering is apparently still taking place.

A national implementation plan for Directive No. 16 has not yet been approved. However, certain provinces have advanced with their own plans. An example is the Implementation Plan

157 According to one national assessment, the 4IR was not openly discussed in the country until the Viet Nam ICT Summit on the theme of "Digital Revolution: Opportunities and Challenges", held on 24 September 2016. At the event, Prime Minister Nguyen Xuan Phuc delivered his keynote speech on the "digital revolution," which proved to be an early iteration of 4IR. See Truong Min Vu and Nguyen Vu Nhat Anh: *The Fourth Industrial Revolution: A Vietnamese discourse* (Friedrich Ebert Foundation, Hanoi, 2017).

158 There are more narrowly defined plans as well that are framed around modernization through technological progress, such as the Mechanical engineering industry development strategy to 2020 and the Science and technology programme for new countryside construction in the period 2016–2020.

159 See Figure 21 in A. Cameron, T. Pham and J. Atherton: *Vietnam Today – first report of the Vietnam's Future Digital Economy Project* (Commonwealth Scientific and Industrial Research Organisation (CSIRO), Brisbane, March 2018).

for Directive No. 16 of Lam Dong province, which contains the following detailed tasks intended to pave the way for the 4IR in this particular province:[160]

1. Renew training in the system of professional education establishments in the direction of developing human resources and changing jobs with suitable skills, capable of receiving, mastering and effectively exploiting the technology of the 4IR.
2. Advise to build a scheme on developing a network of professional education establishments in the province in order to develop human resources, ensuring suitable quantity, quality, and structure, step by step forming a high-quality workforce.
3. Direct vocational establishments to promote vocational training for rural labourers focusing on training of skills in applying new technologies and equipment to agricultural production; improve the quality of training to approach the level of developed countries in ASEAN and the world.
4. Propose orders for science and technology tasks in order to develop solutions to mitigate and minimize impacts of the 4IR on the labour market and social security.

A general interpretation of the available planning text, noting that the national implementation plan is not yet available, is that the tasks fall almost entirely in the realm of driving skills development for economic growth through training. While task (i) seemingly looks at the training of students, task (iii) seems to imply the retraining of existing workers, which could mean there is an understanding that the push toward industrialization will lead to some job losses in existing – presumably lower-tech – enterprises. Task (iv) aims to propose scientific and technological orders to address 4IR-induced challenges related to the labour market and social protection system but falls short of defining what kind it anticipates and how science, technology and information policies and orders could help address them. However, it does seem an important clause in its tacit assumption that there will be a need to mitigate impacts on the labour market and the system of social protection.

We can also assume that existing infrastructure for TVET will be utilized but also expanded to a wider – and more tech-based – array of training options for targeted audiences (e.g. rural labourers).[161] Already at the national level, the **Law on Vocational Education 2014 (Law No. 74/2014/QH13)** seeks to "encourage and enable enterprises", among other entities, to establish vocational training institutions and conduct trainings.[162]

The Implementation Plan for Lam Dong province also contains tasks that are indirectly linked to labour markets, such as the following assigned to the Department of Finance: "To establish financial and tax mechanisms for enterprises and in science and technology activities". In this specific plan it is not clear if the financial incentives are intended to support enterprise development in S&T firms, with potentially positive spill-overs for job creation, or if financial incentives are to be explored for encouraging and maintaining the highly skilled workforce. Another initiative along similar lines is the **National Technology Innovation Fund**, set up by the federal government in 2015 to provide preferential loans, subsidized loan interest and loan guarantees to enterprises that engage in R&D activities.

The more recent Resolution No. 23 NQ/TW on the **National industrial development policy until 2030 with a vision toward 2045**, March 2018, is another document that discusses a "policy for industrial human resource development" that includes not just improved training facilities with a particular focus on STEM skills and foreign languages in general and vocational education systems, but also promoting policies to attract and use highly qualified talent, both foreign workers and overseas Vietnamese. This policy document is, however, unique among those

160 Lam Dong Portal: "Plan to Implement Directive No. 16/Ct-Ttg dated May 4th, 2017 by the Prime Minister on Enhancing the Access Capacity to the 4th Industrial Revolution". Available at: http://www.lamdong.gov.vn [accessed 4 June 2019].

161 According to the ILO's Viet Nam Decent Work Country Programme 2017–2021 document, the Government revised the TVET Law in November 2014 to set up a more strategic framework for skills development that better connects employers, students and schools. The development of national occupational skills standards as well as a system of competency certification is also underway. TVET reform is gearing up for delivery of a demand-driven system that will help to meet the needs of economic restructuring. ILO: Viet Nam Decent Work Country Programme 2017–2021 (Hanoi, 2017).

162 The National Assembly, Government of Vietnam: *Law on Vocational Education* (Hanoi, 27 November 2014).

found in relation to industrialization. It calls for a "review [for] adjust[ed] and supplement policies to ensure social welfare for employees in the industrial sector, including policies on wages, insurance and labour protection". It would be interesting to investigate if action has been taken on such a review, as it would seem to acknowledge government recognition that higher wages and access to social benefits are also important elements for encouraging and retaining a highly skilled workforce.[163]

Investment in education and training for meeting future skills needs is an important medium- to long-term strategy, but Viet Nam is also studying proposals to meet the more immediate needs for retaining highly skilled workers in other ways.[164] To attract foreign direct investment and, particularly, to encourage investment in high-tech enterprises, the country wants to demonstrate to investors that it is serious about meeting current needs for highly skilled human resources in S&T. Taking examples from European countries, in the **Resolution on enterprise development policy to 2020** (No. 35/NQ-CP, May 2016), the Ministry of Finance is charged to, among other things, study a proposal to "reduce 30% of personal income tax of workers in the fields of IT, hi-tech or agriculture and agricultural hi-tech processing, etc.". According to the OECD's 2011 Taxation and employment study, as of 2010, 15 OECD countries had introduced some form of targeted tax concessions for highly skilled workers with the primary target groups being foreign migrants or returning nationals.[165] Apparently, the applicability of using tax incentives to maintain highly skilled workers is also under study in Viet Nam, but careful attention should be paid to the potential negative consequences such as increased income inequality in the country.[166]

IV. How does the government foresee protecting workers who are potentially affected by technological disruption?

The planning documents for the 4IR, industrial development and competitiveness do not directly engage in the debate on job destruction versus job creation in the face of automation and digitalization. The nearest clause found, albeit in a provincial plan, was in the task assigned in the planning for Lam Dong province (mentioned in III. above) to "propose orders for science and technology tasks in order to develop solutions to mitigate and minimize impacts of the 4IR on the labour market and social security". Further investigation is needed to better interpret the clause, but we can speculate that it could be a call for the development of more effective tech-based provisions of public services (e-government) for making social transfers, including unemployment benefits, as a way to cushion retrenchment. Alternatively, it could refer to retraining programmes that adopt technological content (which is seen in other planning documents like the Science and Technology Development Plan). Training and retraining seem to be the main policy solutions prescribed to mitigate the discomforts of economic restructuring, and for delivery Viet Nam will presumably utilize its existing infrastructure mentioned above, albeit with the expansion of services made explicit in some of the newer "tech-base" policy documents (e.g. in bringing training directly to rural workers).

While not directly mentioned, the Government would presumably fall back on other areas of active labour market policies, includingthe use of employment subsidies for placement of retrenched job-seekers and the retraining of workers. It is important to note in this context that Viet Nam, in January 2019, ratified the Employment Service Convention, 1948 (No. 88) concerning the organization of employment

163 Some provincial implementation plans for Resolution No. 23 now exist – e.g. Quang Binh, Ha Nam, Dong Nai, Ninh Thuan. However, these have not yet been reviewed.

164 Lifelong learning was operationalized in Viet Nam in 2005 with the National Framework for Building a Learning Society, now in its second phase (2012–2020). The Framework includes steps to promote open and distance learning, which also aligns well with the national ITC Development Strategy. For an in-depth assessment of lifelong learning initiatives in all ASEAN countries plus Timor-Leste, see UNESCO Institute for Lifelong Learning: *Lifelong learning in transformation: Promising practices in Southeast Asia*, UIL Publications Series on Lifelong Learning Policies and Strategies No. 4 (Hamburg, 2017).
Centre for Public Impact: "Japan's Lifelong Learning Promotion Law", Case Study, 3 August 2018.

165 OECD: *Taxation and employment*, OECD Tax Policy Studies, No. 21 (Paris, 2011).

166 A recent study on the effectiveness of tax policy for high-skilled migration in EU countries is L. Simula and A. Trannoy: *Is high-skilled migration harmful to tax systems' progressivity? Understanding how migration responds to tax changes will aid in setting the progressivity of a tax system*, IZA World of Labor, 2018.

service. The text of the Decent Work Country Programme 2017–2022 states that: "Appropriate active labour market policies and interventions are needed to optimize employment results induced by these factors [such as technological change]".[167] Existing mechanisms for active labour market policies in Viet Nam include the 2015 Decree on Job Creation Policies and the National Employment Fund, which provides job search support for poor households and young job-seekers, including targeted access to vocational training and financial support.[168]

A recent comparative assessment of labour market policies in ASEAN countries[169] found that between 2010 and 2015, Viet Nam was especially active in its promulgation of active labour market policies (in comparison to other ASEAN countries), although the effectiveness of such actions remains hard to measure. If technological changes and the government push to promote the 4IR do result in job losses over the course of economic restructuring, then the country's active labour market policies, including the national unemployment insurance scheme, will be put to the test.[170]

Are labour standards addressed in relation to planning for Industry 4.0 and/or economic restructuring plans?

Labour standards are not explicitly addressed in relation to planning for new technological developments. The closest clause is that mentioned earlier in relation to the Resolution (No. 23-NQ/TW) on the national industrial development policy until 2030 with a vision toward 2045 (March 2018). This strategy document states that social welfare should be guaranteed for industrial workers, which would seem to relate in this context to wage policy and social protection. More information would be needed to know what this could mean in practice.

How is the country approaching the issue of digital business platforms?

In 2016, the Ministry of Transport issued **Decision No. 24/QD-BGTVT to pilot the application of science and technology in managing and connecting contract-based passenger transportation.** The decision aimed to facilitate the opening up of the transport industry to ride-hailing platform services like Grab and Uber (and more recently Go-Viet and Gonow) in a controlled fashioned. As these new "science and technology application service providers" were not bound by the regulations applied to traditional transport service providers, traditional taxi companies, whose business dropped significantly, felt they were being discriminated against and took their case to the courts. In December 2018, the People's Court of Ho Chi Minh City ruled against Grab and ordered that they pay a fine to the Vietnamese taxi firm Vinasun.[171] Among the advantages claimed by the plaintiffs to accrue to the ride-hailing apps are the ability to avoid taxes and forgo social security guarantees for drivers.

The pilot phase was to last from January 2016 to January 2018, after which the Ministry of Transport was expected to collect opinions from other ministries and relevant authorities on the advantages and disadvantages of "technology taxis" and issue a new decree to replace the existing **Decree 86 of 2014 on conditions for provision of road passenger transport services**. As of now, however, a new government decision regarding the revision of the pilot system and subsequent decree has yet to be made, a signal of the complexity of the social dialogue process that comes with adopting new business models and mitigating impacts. As in other countries, the government grapples with how to define technology-based platform services vis-à-vis their responsibilities to the state (for declaration of revenues) and certainly in their responsibilities to the service providers (drivers) using their apps as a medium (offering social benefits and labour standards).

167 ILO: *Viet Nam Decent Work Country Programme 2017–2021* (Hanoi, 2017).
168 ILO: *Labour market inventory ASEAN 2010–15: Labour market policy in an age of increasing economic integration* (Geneva, 2018).
169 Ibid.
170 To date, only Thailand and Viet Nam among ASEAN countries have unemployment insurance schemes. ILO: *Unemployment protection: A good practices guide and training package – Experiences from ASEAN* (Bangkok, 2017).
171 As of June 2019, the *Vinasun vs. Grab* lawsuit continues in the Ho Chi Minh City People's Court with an appeal by Grab.

V. What are the roles of social partners and the private sector in the strategies or policies specific to technological developments?

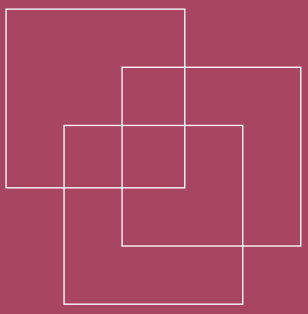
The principal planning for the 4IR in Viet Nam (Strengthening Vietnam's capacity to leverage the 4th Industrial Revolution) was done through a consultative process that involved ministries, academia, cities and provincial authorities, and the private sector. As interest in the topic grew, the Government sponsored or participated in several seminars, workshops and conferences on relevant topics.[172] Furthermore, the Ministry of Labour, Invalids and Social Affairs in December 2017 issued Circular 29 Stipulating for training cooperation (No. 29 /2017/TT-BLDTBXH), which "encourages TVET institutes and enterprises to cooperate in demand-driven training delivery".[173]

At the "ASEAN 4.0: Entrepreneurship and the Fourth Industrial Revolution" event, held in Hanoi on 11-13 September 2018, the role of the private sector to support countries' economic transformations to digital economies was strongly emphasized. An internet search shows some indications of concern raised by trade unionists in Viet Nam who point to potential disruptions to the labour market and a lack of preparedness in the education and training system as a supply side constraint to fostering the 4IR.

172 For example, members of the government, including the Prime Minister, have attended multiple Viet Nam summits and articulated the government position vis-à-vis technological transformation and 4IR. See Ministry of Information and Communications, Government of Viet Nam: "Launching the Vietnam ICT Summit 2017", 7 September 2017; "PM Phuc attended Vietnam ICT Summit 2016", in *The Hanoitimes*, 26 September 2016.

173 Ministry of Labour, Invalids and Social Affairs, Government of Viet Nam: *Circular Stipulating for training cooperation* (No. 29 /2017/TT-BLDTBXH) (Hanoi, 2017).

ILO Regional Office for Asia and the Pacific
United Nations Building, Rajdamnern Nok Avenue
Bangkok 10200, Thailand
Tel.: +66 2288 1234
Fax: +66 2280 1735
Email: BANGKOK@ilo.org
www.ilo.org/asia



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