Strategy Primer

ACCELERATING DIGITAL SKILLS DEVELOPMENT IN INDONESIA

March 2022

ACCELERATING DIGITAL SKILLS DEVELOPMENT IN INDONESIA

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The SMERU Research Institute, in partnership with Digital Pathways at University of Oxford and United Nations Economic and Social Commission for Asia and the Pacific (ESCAP)

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BLK	:	Government-owned job training center/ *Balai Latihan Kerja*
BPS	:	Central Bureau of Statistics/ *Badan Pusat Statistik*
GoI	:	The Government of Indonesia
MCI	:	Ministry of Communication and Informatics/ *Kementerian Komunikasi dan Informatika*
MoE	:	Ministry of Education, Culture, Research, and Technology/ *Kementerian Pendidikan, Kebudayaan, Riset, dan Teknologi*
MoEMR	:	Ministry of Energy and Mineral Resources/ Kementerian Energi dan Sumberdaya Mineral
MoHA	:	Ministry of Home Affairs/ Kementerian Dalam Negeri
MoI	:	Ministry of Industry/ *Kementerian Industri*
MoM	:	Ministry of Manpower/ *Kemeterian Ketenagakerjaan*
MoRA	:	Ministry of Religious Affairs/ *Kementerian Agama*
MoSA	:	Ministry of Social Affairs/ Kementerian Sosial
MoSAUBR	:	Ministry of State Apparatus Utilization and Bureaucratic Reform/ *Kementerian Pendayagunaan Aparatur Negara dan Reformasi Birokrasi*
MoV	:	Ministry of Village, Transmigration, and Disadvantage Regions/ *Kementerian Desa, Transmigrasi, dan Pembangunan Daerah Tertinggal*
MoSMEs	:	Ministry of Micro, Small, and Medium Enterprises/ *Kementerian Koperasi dan Usaha Mikro, Kecil, dan Menengah*
MoSOEs	:	Ministry of State-Owned Enterprises/ *Kementerian Badan Usaha Milik Negara*
NDPA	:	National Development Planning Agency/ *Badan Perencanaan Pembangunan Nasional (Bappenas)*
PLN	:	State Electricity Company/ Perusahaan Listrik Negara
RPJMN	:	Indonesia's National Mid-Term Development Plan/ *Rencana Pembangunan Jangka Menengah*
Sakernas	:	National Labor Force Survey/ *Survei Angkatan Kerja Nasional*
Susenas	:	National Socioeconomic Survey/ *Survei Sosial Ekonomi Nasional*

1. Executive Summary

In the 2021-2024 Digital National Roadmap, the Ministry of Communication and Informatics (MCI) includes digital skills development as a core focus area for achieving the country's objective of digital readiness and competitiveness. This strategy document explores what Indonesia can do to address challenges inhibiting the development of digital skills. It examines the associated opportunities, identifies the key constraints to deliver on these opportunities, and carefully prioritizes recommended actions to respond to the constraints.

This strategy document builds on the analysis in the diagnostic report as it recommends possible cross-sectoral and sector-specific interventions that can be undertaken by the government, the private sector and civil society to increase digital literacy and skills in Indonesia. SMERU, together with its partners, first conducted a diagnostic of the digital skills landscape in Indonesia. The output was a comprehensive analysis of the digital skills situation on the ground, which appraises how Indonesia is performing in terms of digital inclusion, digital literacy, and digital competency in the workforce.

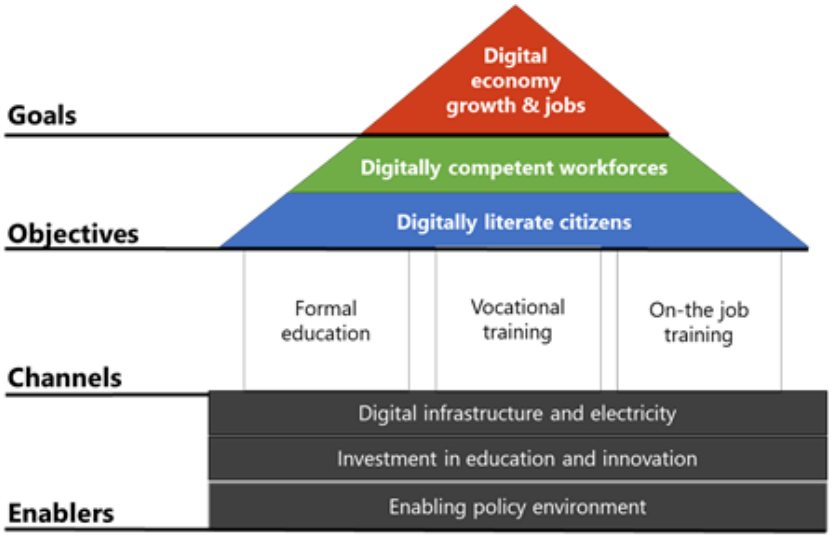
Strategies proposed in this document are in line with Indonesia's National Mid-Term Development Plan, the 2020-2024 Rencana Pembangunan Jangka Menengah (RPJMN), and emphasize the necessary role of digital skills development in boosting the country's digital transformation. Based on a review of the 2020-2024 RPJMN and the potential for digital skills development to deliver on the targets and opportunities identified in the plan, two critical objectives were identified, in which digital skills development can spur on the country's broader goals of digital economic growth and job creation. These objectives are 1) digitally literate citizens; and 2) a digitally competent workforce.

The strategy primer report involved three phases:

1. **A Diagnostic Report on the Digital Skills Landscape in Indonesia,** which provides a baseline analysis of Indonesia's digital skills, outlining the fundamentals required to improve digital skills in the economy and existing challenges;
2. **Multi-stakeholder policy dialogues and interviews** involving 257 participants (222 participants in the policy dialogues and 35 persons in the focus group discussions (FGDs) and interviews) across the government, and private and development sectors to delve deeper into the challenges identified in the diagnostic report, and to ideate potential interventions; and

3. **Thematic validation workshops** with key stakeholders, involving 77 participants, to confirm and elaborate on insights gathered through the consultations and to ideate actionable recommendations for the strategy primer.

This document focuses on the important channels and enablers which must be in place for the objectives to be realized. These are presented in the diagram below.



Digital infrastructure and electrification, investment in education and innovation, and an enabling policy environment serve as fundamental enablers required to spur digital skills development in Indonesia. Digital infrastructure and electricity are foundational requirements for digital transformation and are critical determinants of inclusive access to a country's digital economy and services. Objectives related to this enabler include accelerating ICT and energy infrastructure developments to increase internet usage to ~82% and achieve a 100% electrification ratio by 2024[1], and supporting digital skills acceleration through inclusive access to digital infrastructure in Indonesia.

The main challenges in digital infrastructure relate to the low quality of ICT and energy infrastructure in rural areas, and the high cost of fixed and mobile internet packages. Seven actions are proposed relating to more affordable and higher quality internet connections and the expansion of sustainable energy infrastructure. The actions includes five solutions to address ICT infrastructure challenges; 1) expediting the implementation of the blended finance scheme between the USO Fund and APBN to accelerate the utilization of backbone infrastructure through the development of middle mile networks; 2) expanding last mile networks and digital services to public services; 3) implementing additional Indonesia Internet Exchange (IIX) platforms in regions other than

[1] Government of Indonesia, 2020.

Jakarta; 4) implementing a price ceiling policy for mobile internet packages; and 5) broadening the mandate of the USO Fund to subsidize the cost of smartphones. The remaining two solutions aim to address energy infrastructure challenges, these include: 1) accelerating existing energy infrastructure project developments; and 2) implementing mini-grid solar home pack systems (SHS) in rural areas.

Investment in education and innovation empowers individuals, businesses and the government to provide transformational, high-quality teaching and training services, creating a conducive environment for digital skills development. The objectives related to this enabler aim to ensure that the mandated 20% education budget allocation is spent effectively by local governments and to increase the national government budget allocation for R&D to 1.68% of GDP by 2025[2], to advance ICT skills development, with contributions from the private sector in order to mobilize digital transformation. Five actions are proposed to optimize subnational governments' use of education spending and to incentivize more industries and businesses to participate in innovation relating to digital technologies. This includes two solutions to address subnational government budget specific challenges: 1) optimizing the use of the Neraca Pendidikan Dasar (NPD) platform to ensure that the subnational government budget allocation of 20% for the education sector is spent; and 2) conducting regular meetings with education stakeholders at the subnational government level to discuss the central government's directed policies and to gather ideas on how to improve the quality of education. The remaining three solutions aim to address research and development specific challenges, and include: 1) promoting the super tax deduction program for companies/industries investing in R&D; 2) providing technical assistance for selected industries to advance digital implementation; and 3) establishing a matching fund for more digital technology innovations.

An enabling policy environment is important to support digital skills development. The core objective relating to this enabler is to develop a holistic policy and governance framework to support digital skills development in Indonesia. The main challenges include a lack of detailed policy frameworks for digital skills development and limited government capacity to manage digital skills initiatives. Six actions are proposed to accelerate the development of a policy framework for digital skills. These include two solutions to address digital skills specific policy framework challenges: 1) creating a National Committee for Digital Acceleration (NCDA) to accelerate the digital transformation agenda in Indonesia; and 2) developing a detailed policy framework for digital skills development. The second two solutions address government capacity specific challenges, including: 1) improving the recruitment process of public servants; and 2) retaining the

[2] The national five-year target for gross domestic spending on R&D (GERD/GDP).

existing employment and learning processes within the governmental sector. The remaining two solutions aim to address national indicators for digital skills development specific challenges, including: 1) developing an M&E framework to track digital skills development which leverages digital skills data collected by BPS; and 2) developing a Digital Talent Management System (DTMS) to match the supply and demand of digital talent.

Formal education, vocational training, and on-the-job training are three important channels through which Indonesia can achieve its digital skills objectives. These strategic channels are direct mechanisms for the economy to improve the digital literacy of its citizens and the digital competency of its workforce in achieving the economy's broader goals of boosting the digital economy and job creation.

Formal education provides foundational skills for improving the digital literacy of citizens and the digital competency of workers. Objectives related to this channel include a target of 36% of students with PISA reading scores at level 2 proficiency by 2024, and ensuring that 50% of the workforce has intermediate or advanced digital skills by 2024.[3] The main challenges relate to the low levels of access to formal education at the secondary and tertiary level, an underdeveloped ICT curriculum, and poor teaching quality. Six actions are proposed which relate to expanding the coverage of education scholarships for low-income families, the development of an occupational-based ICT curriculum, and capacity building for ICT teachers and lecturers. The first solution addresses challenges related to access to formal education by: 1) optimizing the existing "Smart Indonesia Card (Kartu Indonesia Pintar/KIP)" program, which targets students from low-income groups. The second set of solutions aims to address curriculum quality specific challenges. This includes: 1) expanding the scope of ICT learning at the primary and secondary level; 2) improving the effectiveness of the "Kampus Merdeka" program to present high-quality apprenticeship opportunities to students at the tertiary level; and 3) developing an occupational-based ICT curriculum by establishing collaborations with private sector organizations. Lastly, the remaining set of solutions addresses challenges around teaching staff, and includes: 1) providing training in methodological skills to deliver teaching materials (pedagogy) and the substantive abilities (ICT curriculum understanding) of teachers at the elementary and secondary levels; and 2) improving the expertise of lecturers at vocational colleges/universities.

Vocational training is a flexible and inclusive channel to upgrade the digital skills of citizens and the workforce outside of formal education. This channel focuses on the objectives of improving the quality of public training institutions/*Balai Latihan Kerja* (BLK)

[3] Government of Indonesia, 2020.

in ICT and expanding access to private ICT training institutions. The main challenges relate to the low quality of BLKs in ICT and limited access to private ICT training institutions. Four actions are proposed to improve the quality of BLKs and expand low-income families' access to ICT training. This includes three solutions to address challenges related to the quality of BLKs: 1) accelerating the provision of competency standards, training agendas, and certification for emerging ICT occupations; 2) preparing a guideline and incentives for industries to be involved in the development of competency standards; and 3) working with ICT training vendors, higher education institutions, industries, and the MCI in the provision of quality BLK-ICT instructors. The remaining solution aims to address challenges related to access to private training institutions by 1) conducting ICT training for workers from low-income families.

On-the-job training (OJT) is an important channel to re-skill and up-skill both formal and non-formal workers focusing on their digital skills. This channel aims to achieve two objectives: 1) 50% of the workforce having intermediate or advanced digital skills by 2024, increased from 13% in 2020; and 2) obtaining 30 million go-digital[4] MSMEs by 2024, up from 13.7 million in 2021.[5] The main challenges are that current OJT does not focus on ICT technical skills and that MSMEs have limited access to digital skills training. Four actions are proposed to incentivize more industries to participate in ICT skills training for their workers and to encourage higher rates of digital adoption among MSMEs. These include two solutions to address challenges specific to OJT in the formal sector: 1) developing employment tax incentives; and 2) integrating training vendors' input on digital skills training into current OJT programs. The remaining two solutions aim to address challenges related to MSME digital adoption, including: 1) developing a large-scale and extensive training agenda for MSMEs; and 2) providing digital facilities to ensure sustainable usage of the digital economy ecosystem.

Having proposed a set of carefully prioritized recommended actions for digital skills development, this document serves as a strategic guide for the GoI to achieve the broader goals of digital economic growth and job creation.

[4] Based on the information presented during a keynote speech by the Minister of Micro, Small, and Medium Enterprises (MSMEs) at an Indonesian Fintech Association (Aftech) online discussion in July 2020, Go-digital MSMEs are MSMEs that have an online selling platform, either through e-commerce or social media.
[5] Government of Indonesia, 2020.

2. Introduction

Strategy Overview

Digital skills are crucial to accelerate the achievement of Indonesia's development goals and stimulate its drive towards sustainable digitalization. Indonesia's 2020-2024 National Mid-Term Development Plan, Rencana Pembangunan Jangka Menengah (RPJMN), emphasizes the role of digital transformation in boosting economic productivity and efficiency, as well as generating more economic value. The development of digital skills is necessary to implement the country's digital transformation.

There is room to improve digital inclusion in Indonesia, a situation which is further analyzed in our diagnostic report.[6] Gaps in digital literacy stem from unequal access to connectivity infrastructure, the high cost of devices, and the associated low usage of platforms. The RPJMN target for internet penetration is 82% by 2024, meaning that the challenges around accessibility and connectivity that have resulted in low internet usage, which is currently at 54% of the population, must be prioritized to support the development of digital skills in the context of Indonesia's broader digital transformation goals. To have a digitally competent workforce, the country requires strategies to increase broad-based digital skills and to ensure that technological abilities are acquired by citizens before entering the job market. A concerted effort is required to improve the inclusivity of digital skills in Indonesia.

The current low levels of digital literacy must be addressed systematically, particularly through formal education from the primary school level. The strategy to improve digital literacy aims to improve young people's use of the internet and other digital technologies. Similarly, it is important to ensure citizens are equipped with the necessary skills to navigate the digital world without endangering themselves. For example, the public must be able to select credible information online and avoid harmful content, including hoaxes and cyberbullying. This is achieved by improving people's basic literacy in order to increase reading performance, including understanding and memorizing a text and summarizing information.[7]

[6] The SMERU Research Institute, forthcoming.
[7] OECD, 2019.

Indonesia's workforce must be equipped with adequate digital skills to respond to the rapid pace of technological advancement, which is altering the economy's job landscape. This requires the country to improve the adaptability of its workforce by providing high-quality, digitally-focused vocational and tertiary education that teaches the skills required by industries. Reducing the cost of quality vocational training and systematic on-the-job training is imperative to improving the digital skills of the economy's workforce, especially for those who cannot access higher formal education. More intensive collaborations between the government, formal and non-formal education institutions, and industries will be required to promote occupation-based learning.

This strategy primer is essential to map the main actions required to narrow digital skills gaps in order that Indonesia can achieve its development goals. The strategy primer aims to provide a detailed set of recommendations to support the implementation of the digital skills development framework in the 2020-2024 Indonesia Digital National Roadmap, which underpins the GoI's digital transformation strategy. The MCI is currently develping the roadmap in response to President Jokowi's instruction to accelerate digital transformation in Indonesia.[8] The roadmap conceptualizes digital skills as a foundational pillar that must be translated into strategic initiatives related to digital literacy and digital competency in the workplace.

Indonesia's Development Vision

Indonesia's 2045 vision is to become a developed country, and a global economic player with the 5th largest GDP in the world. The vision is notable as 2045 will mark the centenary of Indonesia's independence. Indonesia's 2045 vision emphasizes human development and the advancement of science and technology as the central pillars to improve its quality of life and economic productivity. The country will be equipped to respond to changes in economic structures and the employment landscape, particularly owing to the global disruption caused by rapid digitalization, through digital skills development.

Currently, Indonesia's 2020-2024 RPJMN is a stepping stone towards this vision. It mainstreams the role of digital transformation in accelerating economic growth to an annual rate of 5.7% - 6.0%; creating 3 million jobs per year; and reducing poverty by 6.0%,

[8] Wisnubroto, 2021.

as outlined in Figure 1. Digital transformation will enable Indonesia to raise its economic productivity, advance structural changes, and generate a valuable digital ecosystem.

Figure 1. Key targets in Indonesia's development goals

Source: Adopted from the 2020-2024 RPJMN (Government of Indonesia, 2020)

The development of digital skills in Indonesia must begin by creating more opportunities for citizens to participate in the digitalized ecosystem, thereby aiding in achieving the key targets illustrated above. The provision of equal access to digital infrastructure and devices is necessary to increase the proportion of internet users. Furthermore, promoting inclusive digital skills development will pave the way to achieving Indonesia's 2045 Development Vision. Appropriate digital skills development will support digital inclusion and produce the competencies required to grow the digital economy.

3. Strategy Framework

Strategy to improve digital skills in Indonesia

Objective: Achieve digital economic growth and job creation in Indonesia by shaping digitally literate citizens and digitally competent workforces.

This objective will be achieved through three separate channels: formal education; vocational training; and on-the-job training, which will help to develop the digital skills of citizens and workforces. These channels are supported by three foundational pillars, which enable digital skills transformation. Table 1, presented below, provides information on the objectives of this strategy primer and the intended targets, as well as proxy indicators to measure the success of each channel in achieving digital skills development in Indonesia.

Table 1. Objectives of Indonesia's Digital Skills Strategy Primer

Objective	2024 Target from the RPJMN	Proxy	Main channel	Enabler
Digitally Literate Citizens	1. 82% of the population uses the internet 2. 36% of students with PISA Reading Scores above the minimum standard	1. % Individuals >5 years old with access to the internet 2. % Students with minimum standard PISA Reading Score	Formal education: primary and secondary education	1. ICT infrastructure and electricity 2. Investment in education and innovation 3. Policy enabling environment
Digitally Competent Workforce	50% of workers have intermediate and advanced digital skills, up from ~13%[9]	% Workforce with basic, intermediate, and advanced digital skills	1. Formal education: vocational and higher education 2. Vocational training 3. On-the-job training	

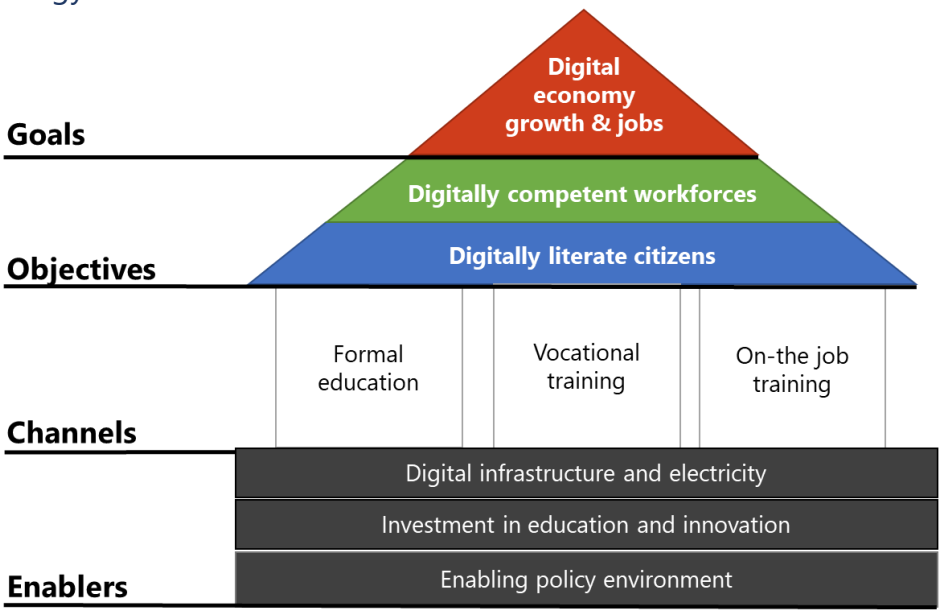
Source: Author

[9] Calculated from the 2020 National Labor Force Survey (SAKERNAS) data; see the diagnostic report in The SMERU Research Institute (forthcoming).

Approach

This strategy was informed by a targeted approach to understanding the current state of the Indonesian digital skills landscape. The most critical areas for opportunity have been considered in order to accelerate Indonesia's development goals for inclusive economic growth and job creation, focusing on the creation of digitally literate citizens and digitally competent workforces, as illustrated in Figure 2. The objectives are built from digital skills development enablers, as well as infrastructure, financial, and policy frameworks. The enablers will determine the level of access and quality of digital skills channels in Indonesia, including formal education, vocational training, and on-the-job training.

Figure 2. Strategy Primer Formulation Framework



Source: Author

This strategy primer was developed based on 11 multistakeholder workshops across six themes[10]. The workshops involved 77 participants from the government, private sector institutions, universities, NGOs, and experts (see Appendix 1). The workshops led to a consensus on the targets[11] and actions required to address the strategic issues found in the diagnostic report.

[10] The workshops included six themes: higher education, basic education, non-formal upskilling opportunities, digital access and infrastructure, electricity, and investment in digitalization.
[11] Including the proxies.

This strategy primer report evolved through three phases:

1. **Diagnostic Report on the Digital Skills Landscape in Indonesia**, which provided a baseline analysis of Indonesia's digital skills, outlining the fundamentals required to improve digital skills in the economy and existing challenges;
2. **Multi-stakeholder policy dialogues and interviews**, which involved 257 participants (222 participants in the policy dialogues and 35 persons in the FGDs and interviews) across government, private, and development sectors to delve deeper into the challenges identified in the diagnostic report, and to ideate potential interventions; and
3. **Thematic validation workshops** with key stakeholders, involving 77 participants, to confirm and elaborate on insights gathered through the consultations in order to come up with actionable recommendations for the strategy primer.

This strategy primer emphasizes the role of digital transformation in accelerating economic development and job creation. However, to capitalize on this growth and opportunity, a digitally skilled workforce and population is required. The strategy primer identifies opportunities for targeted digital skills improvement and critical enablers that facilitate these opportunities. The following sections of the strategy primer delve deeper into the challenges inhibiting digital skills development, and how these can be overcome. Section 3 describes three separate enablers, which comprise the foundational elements required for Indonesia to move toward a digitally skilled economy. Section 4 unpacks each of the channels that can be utilized to achieve a digitally skilled nation. The key challenges, as well as the associated initiatives in both Section 3 and 4 are summarized in tables at the end of each subsection. Section 5 concludes the strategy primer with key insights and consolidates the way forward.

4. Enablers

There are foundational elements required to enable the development of adequate skills in Indonesia. These enablers are catalysts for unlocking value through digitally skilled citizens and digitally skilled workforces to achieve the economy's broader goals of digital economic growth and job creation. For each enabler, the most pressing challenges and appropriate strategic interventions to address these challenges are presented.

Digital infrastructure and electrification, investment in education and innovation, and an enabling policy environment serve as the most important enablers required to spur digital skills development in Indonesia. Digital and electrical infrastructure are foundational requirements for digital transformation and are critical determinants of inclusive access to a country's digital economy and services. Investment in education and innovation empowers individuals, businesses, and the government to provide revolutionary and high-quality teaching and training services, creating a conducive environment for digital skills development. This enabling environment is underpinned by effective policies that support digital transformation.

4.1. ICT Infrastructure and Electrification

Objective: Accelerate ICT and energy infrastructure developments to increase internet usage to ~82% and achieve 100% electrification by 2024[12], supporting digital skills acceleration through inclusive access to digital infrastructure in Indonesia.

The challenge

Indonesia has made progress in broadening internet and electrification connections. However, issues around access to high quality digital infrastructure remain. Indonesia has been positioned as one of the fastest growing digital economies in Southeast Asia[13], as proven by the rapid growth in its internet-using population. However, 46% of the population remain unconnected, resulting in a persisting digital divide. Electrical distribution is uneven, with high consumption in urban and industrial areas, and low consumption in more rural areas. The country is also characterized by frequent blackouts, inhibiting consistent economic activity.

[12] Government of Indonesia, 2020.
[13] World Bank, 2021a.

Challenges related to ICT infrastructure

On the supply side, the quality of ICT infrastructure is poor. Limited access to quality internet in rural areas is perpetuated by supply- and quality-related issues not experienced in urban areas.

a. Contributing factors to the inadequate ICT infrastructure include the challenging geographical landscape of areas outside of Java and in the 3Ts region, limited availability of spectrum transmission services and limited investment in ICT infrastructure projects. Furthermore, economies of scale in low-density populated areas are small, with Internet Service Providers (ISPs) incurring high infrastructure costs. This issue is exacerbated by community resistance against construction, complicated land acquisition processes, and the high cost of workers. In addition, COVID-19 has delayed investment and expansion efforts.[14]
b. Rural populations rely on public service spaces (schools, health facilities, village offices) to access the internet, as they have limited access to quality mobile and fixed broadband services. However, 30% of public service spaces do not have internet access[15], inhibiting citizens, specifically lower-income groups, from participating in the digital economy.

> **Example 1: Slow data transmission speeds in Indonesia**
>
> The current poor quality of Indonesia's internet services is attributable to the slow transmission speeds for mobile (14.04 Mbps) and fixed (20.13 Mbps) data.[16] Comparatively, Singapore residents experience data transmission speeds of 54.37 Mbps for mobile and 197.26 Mbps for fixed broadband.[17] In a global survey, Indonesia's internet speed scored poorly, ranking 68 out of 77 countries.[18]

On the user or demand side, fixed internet packages[19] are expensive due to regional internet data traffic being concentrated in Jakarta, and mobile internet packages being subject to tariff pricing for cost recovery. Furthermore, the cost of digital devices, particularly smartphones, is unaffordable for lower-income segments of the

[14] World Bank, 2020.
[15] MCI, 2020.
[16] Boyland and Khatri, 2019.
[17] Ookla, 2021.
[18] Khidir, 2019.
[19] Fixed internet is high-speed, reliable internet accessed by plugging into a cable or digital subscriber line.

population, preventing productive-age [20] residents, which make up ~68% of the population[21], from engaging in the digital economy.

a. Only ~10.7 million citizens use fixed internet packages[22], which are typically the primary internet service used by households and businesses. These fixed internet packages are largely used in urban areas. The major deterring factor against wider adoption of fixed internet packages is cost, underpinned by cumbersome data traffic, as explained in point 2. In 2019, fixed broadband internet packages in Indonesia cost USD 78 per 10 Mbps, while in Singapore they cost USD 44 for 1,024 Mbps.[23] [24]
b. Comparatively, mobile internet packages are less expensive, allowing for inclusive participation in the digital economy. However, ISPs have adopted tariff pricing for mobile internet packages to make up for lost revenue in sparsely populated areas. This is achieved by inflating the final price for all consumers, creating inefficiencies in consumption and production for lower-income consumers. This leaves mobile internet package users vulnerable to significant price increases.
c. Digital devices incur expensive logistic costs, making them unaffordable for consumers. 50% of residents in rural Indonesia cannot afford a smartphone device, with the cost of low-end smartphones reaching USD 100-300, amounting to ~78% of the monthly income of poor urban citizens. [25] Production components are imported and delivered to Jakarta only, increasing the distribution costs to other regions, and limiting the choice of affordable digital devices for citizens living outside of Jakarta.

[20] Aged 15–64 years old (Wisnumurti, Darma, and Suasih, 2018).
[21] Knoema, 2020.
[22] World Bank, 2020.
[23] CEIC, 2020.
[24] There is no clear distinction between the price for fixed internet packages in rural and urban areas in Indonesia.
[25] Processed from Susenas as of 2020.

Example 2: Data traffic in Jakarta[26]

Previously, ISPs operated on different networks in Indonesia, requiring data traffic to be circulated via intermediary networks and the international server before reaching its end destination. This led to the development of the Indonesia Internet Exchange (IIX), a national interconnection point for ISPs which circumvents the need for ISPs to transmit their data through intermediary networks abroad. Although the IIX has been able to reduce the inefficiencies that occur from international internet data traffic, most internet data interconnections in the regions still need to connect to the IIX located in Jakarta. Consequently, regions located further away from Jakarta incur significant costs to divert data traffic via the Jakarta IIX, impacting the price of internet packages available to the residents of these areas.

Energy-specific challenges

The provision of electrical infrastructure is costly and unprofitable, leading to a lack of access to quality electrical services. This issue is exacerbated by the government's limited budget for the State Electricity Company (PLN).

a. Indonesia's electrification ratio is currently 99%. This figure defines the number of households that are provided with some form of electricity via the national grid. The challenge lies in the quality of electricity provided and the fact that current generating capacity cannot keep up with demand, leading to frequent power outages. To improve the quality of electricity, grid extension is required. This is difficult due to the geographical landscape of the 3T regions, characterized by challenging terrain and poor basic infrastructure, as well as significant construction delays owing to COVID-19. Investing in additional infrastructure in these areas is therefore not economically viable for service providers as it is difficult to achieve economies of scale. Furthermore, PLN does not include rural areas as priority areas for quality improvements or infrastructure expansion, and the limited budget it receives from the GoI results in these areas being neglected.

Strategic interventions

To address the current ICT and energy infrastructure challenges, several initiatives are proposed. These will be important for achieving targets including 82% internet usage and

[26] Raised in the thematic workshop consultations hosted by SMERU between October and November 2021.

a 100% electrification ratio, with significantly less outages, by 2024. These interventions are in line with the 2020-2024 RPJMN and prioritize the establishment of a strong infrastructure foundation that supports a thriving digital skills ecosystem. **Five** solutions relating to more affordable and higher quality internet connections, and **two** solutions relating to expanding sustainable energy infrastructure are discussed below.

1. ICT Infrastructure

Discussions during the policy dialogues revealed five strategic actions that can be taken to address Indonesia's ICT infrastructure challenges. The first two focus on expanding ICT infrastructure and addressing existing network quality issues by expediting the expansion of backbone and last mile networks. The next two solutions center around improving the affordability of fixed and mobile internet packages by accelerating the development of additional IIX platforms and implementing a price ceiling policy to accelerate participation in the digital economy. The last action addresses the high cost of digital devices experienced by lower-income consumers. The five strategic actions are as follows:

a. ***Expedite the implementation of the blended finance scheme*** between the Universal Service Obligation (USO) Fund and the National Budget (APBN). This solution, which aims to accelerate the utilization of backbone infrastructure from 31% in 2020 to ~53% in 2024 through the development of middle mile networks (detailed in Example 3), emerged during the policy dialogue discussions. The use of marine and terrestrial fiber optics will aid in this objective. However, this requires more appropriate financial support. By accelerating the implementation of a co-funding arrangement between the USO Fund and the additional budget allocated to the 2021 National Budget (APBN) for ICT infrastructure development of ~USD 2.1 billion, the GoI could fund additional backbone utilization and middle mile network expansion.[27] This could be achieved by leasing satellites and paying for the manufacturing of Satria satellites.[28] Blended financing agreements have proven successful in assisting developing countries with recovering and building infrastructure in the aftermath of COVID-19.[29]

[27] Eloksari, 2020.
[28] Raised in the thematic workshop consultations hosted by SMERU between October and November 2021.
[29] OECD, 2020.

Example 3: Existing fibre-optic infrastructure developments

The GoI has made significant progress in expanding network coverage across Indonesia, completing backbone infrastructure expansion in 2019. However, internet coverage in rural areas remains low, which exacerbates the limited engagement with internet services. In 2016, the GoI launched the Palapa Ring Project with the objective of extending fiber-optic and wireless networks across the archipelago. The GoI adopted a public-private partnership and availability payment model (PPP AP) to finance the laying of 11,000 kilometers of offshore and onshore fiber-optic cables and the building of transmission towers to expand internet coverage to 100% in western and central regions of Indonesia and 98% in the east by 2019. Despite the success of the Palapa Ring Project, rural and remote regions remain uncovered, with ~94 million people unable to access the internet due to limited middle and last mile network expansion.

b. ***Expand last mile networks and digital services to public services***. This solution was raised in the policy dialogue discussions and is critical to expedite internet access for lower-income citizens. Public spaces require last mile network connections to facilitate this. The MCI is making progress by establishing 4G Base Transceiver Stations (BTS) in 7,074 villages over the next two years. However, this process can be accelerated by guaranteeing additional funding. Subnational governments in Indonesia struggle to fast-track infrastructure development projects, which span over more than one year, due to limited APBN funding. For example, *PT. Sarana Multi Infrastruktur* required additional funding support from the World Bank for the Regional Infrastructure Development Fund to improve community welfare and district competitiveness.[30] Funding for the digitization of public spaces can be achieved through three broad channels:
   i. The MCI could issue a Request for Proposals for additional service provider(s) to assist with the expansion of last mile networks to public spaces, with the support of an appropriate funding organization.
   ii. ISPs and telecommunications service operators could be granted "tax holidays" for using their Corporate Social Responsibility budgets to fund last mile infrastructure developments. A tax holiday is a government incentive program that offers a tax reduction or elimination to businesses as a means of stimulating investment in strategic areas.

[30] World Bank, 2017.

iii. ISPs could engage with villages to establish Village-Owned-Enterprise (VOE) programs in partnership with the MCI. ISPs can provide these VOEs with CSR-funded data packages, which could be obtained by residents from the VOEs to be used for hot spotting in public spaces.

c. ***Implement additional Indonesia Internet Exchange (IIX) platforms*** in regions other than Jakarta.[31] IIX is a national interconnection point for ISPs, which circumvents the need for ISPs to transmit their data through intermediary networks abroad, as explained in Example 2 above. This intervention materialized in the policy dialogue discussions. The provision of additional IIX platforms can minimize the costs incurred by ISPs and make exterior regions more economically viable. The establishment of additional IIX platforms in various locations across Indonesia could reduce the financial burden of ISPs utilizing the IIX in Jakarta, by reducing the interconnection costs between ISPs. Establishing additional IIX platforms across Indonesia would also assist with improving the quality of internet speed, as data will not need to be transmitted via Jakarta, which requires the data to travel long distances, negatively impacting the speed.

d. ***Implement a price ceiling policy for mobile internet packages.*** This initiative emerged during the policy dialogue discussions and is crucial to ensuring mobile internet packages remain affordable for lower-income citizens. A price ceiling policy will act as a mechanism to ensure price tariffs do not excessively inflate consumer prices. The GoI can draw on the experience of the Mandatory Standard on Access Pricing (MSAP) implemented in Malaysia and ensure that the price ceiling takes into consideration citizens' locations relative to nearby IIX platforms and the economies of scale in specific regions. Price ceilings (caps) have been a successful means of lowering barriers to entry for emerging telco providers and ensuring affordable pricing for consumers in South Africa. In the early 2000s, the Ministry of Communications introduced a price cap[32] on fixed-line retail services provided by telco monopoly, Telkom, due to Telkom's broadband services being one of the most expensive across international peer countries at the time.[33]

e. ***Broaden the mandate of the USO Fund to subsidize the cost of smartphones.*** Experiences from Pakistan may provide some reference here. This solution leverages a similar intervention to that adopted by the Pakistani government's Ministry of Information Technology and Telecommunication. The Pakistani

[31] Raised in the thematic workshop consultations hosted by SMERU between October and November 2021.

[32] This price cap was linked to 1.5% of Telkom's productivity factor, coupled with a maximum movement of 20% in real terms for any individual price. The cap excluded wholesale services and services where Telkom faced competition.

[33] South Africa Foundation, 2005.

Government implemented a similar solution that provided smartphones to 30,000 low-income women using the Universal Service Funds (USF)[34]. Indonesia's USO Fund can be utilized to subsidize the cost of smartphones for low-income citizens. In 2007, the services covered by the USO Fund were broadened to include the provision of "telecommunications and information technology services, public phone services 24 hours a day, independent technology, local content priority, internet, and broadband". However, independent technology does not include digital devices, including smartphones. Most low-income individuals are unable to access digital services due to the high cost of smartphones. Whilst feature phones offer basic foundational technology from which digital enablers and some applications can be accessed, and are affordable to own, smartphones are preferable as they allow users to fully utilize features and have fast 3G connectivity. This is preferable, especially for citizens looking to engage in digital skills training and e-Learning. By mandating the USO Fund to subsidize funding for smartphones, citizens will be able to better participate in the digital economy and access digital content.

2. Energy Infrastructure

There are two critical issues related to energy infrastructure. First, generating more capacity to limit the frequency of outages and satisfy demand for citizens who are connected to the grid; and second, providing immediate access to energy for citizens who are not connected to the grid and require access to electricity to participate in the digital economy. The proposed strategic actions are as follows:

a. ***Accelerate existing energy infrastructure project developments.*** This intervention emerged from the 2020-2024 RPJMN as well as the policy dialogue discussions. The expedited infrastructure developments should focus on increasing power plant capacity by 27,000 MW; transmission networks by 19,000 km; and substations by 38,000 MVA by 2024 to ensure access to higher quality electricity.[35] This intervention is designed to address the current undersupply of electricity and improve the quality of electricity services in rural communities, particularly those residing in the 3Ts region. Whilst this is an existing project currently underway, PLN

[34] Karlsson et al., 2017.
[35] Raised in the thematic workshop consultations hosted by SMERU between October and November 2021.

has not yet met its targets due to COVID-19 related delays, as mentioned in Example 4 below.

Example 4: Existing power plant capacity developments[36]

Power plants and substations in Indonesia are built in areas close to cheap energy sources that can fulfil most of the energy requirements of the surrounding areas. PLN is then able to transmit electricity to broader locations using high voltage transmission from the generating center. In 2020, the government aimed to increase power plant capacity by 5,209 MW; transmission networks by 4,456 Kms; and substations by 14,247 MVA. However, in January 2021, only ~50-60% of these targets had been realized, or 55% of the target for power plant capacity, 59% of the target for transmission networks, and 55% of the target for substations. The targets were unable to be met due to the COVID-19 pandemic, which caused construction and worker restrictions. This adversely impacted the reliability of the supply of equipment and materials. As a result, the GoI postponed the program's commercial operation date.

Source: 2020-2024 Medium-term national development plan (RPJMN).

b. ***Implement mini-grid solar home pack systems (SHS) in rural areas.*** A feasibility study should be carried out to check whether the success of SHS in Africa can be replicated in Indonesia. SHS should be implemented as an immediate solution to providing sustainable energy access to rural dwellers, under the condition that they are installed and maintained by service providers. SHS systems have been a successful means of leveraging renewable resources to provide rural communities with access to electricity in both Kenya and Tanzania. Over 10 million households in Kenya use off-grid SHS systems, allowing these households to decrease their kerosene consumption and better participate in the digital economy by charging their digital devices.[37] The 3T regions are generally not covered by the PLN electricity grid and grid expansion to these areas is likely to take a couple of years. While solar mini-grid initiatives have previously been implemented in the 3T regions, limited access to the human capacity required for adequate maintenance of these systems resulted in these grids becoming redundant. To avoid historical maintenance issues associated with these systems, the MoEMR should incorporate a clause into the terms of agreement with the chosen SHS provider.

[36] Raised in the thematic workshop consultations hosted by SMERU between October and November 2021.
[37] Wagner et al., 2021.

Table 2 provides a summary of the key digital infrastructure actions to be undertaken as part of this strategy, with an indication of the time frame, responsible stakeholders and potential funding sources where applicable.

Table 2: Key Actions to Drive ICT Infrastructure and Electrification

Objective: Accelerate ICT and energy infrastructure developments to increase internet usage to ~82% and achieve 100% electrification by 2024, supporting digital skills acceleration through inclusive access to digital infrastructure in Indonesia			
Actions required	**Time frame**	**Responsible stakeholders**	**Potential funding sources**
Expedite the implementation of the blended finance scheme between the USO Fund and the National Budget	Short term	MCI	USO Fund; APBN
Expand last mile networks and digital services to public services	Immediate	MCI, MoV	USO Fund; Village Fund; APBN
Implement additional IIX platforms	Short term	MCI	APBN
Implement a price ceiling policy for mobile internet packages	Short term	MCI	APBN
Broaden the mandate of the USO Fund to subsidize the cost of smartphones	Short term	MCI	USO Fund
Accelerate existing energy infrastructure project developments	Medium term	PLN; MoEMR	APBN
Implement mini-grid solar home pack systems in rural areas	Immediate	MoEMR, MoV	APBN, Village Fund

Source: Author

4.2. Investment in Education and Innovation

Objective: Ensure the mandated 20% education budget allocation is spent effectively by local governments and increase the national government budget allocation for R&D to 1.68% of GDP by 2025 to advance ICT skills development, with contributions from the private sector to mobilize digital transformation.

The challenge

Budget allocation for both the education sector and R&D is inefficiently coordinated and allocated, limiting investments in advancing digital talent. In 2019, the central government managed around 35% of the state budget and allocated the

remaining amount to local governments (34 provinces and 514 districts/cities) through the Transfer to Regions and Village Fund (TD3) policy. The central and local governments are responsible for the spending of their mandated 20% allocation of the education budget. However, there is a lack of coordination between the responsible parties, and other stakeholders within the subnational governments are rarely involved in the budget planning process. Furthermore, budget allocation for R&D is low and digital innovation is not prioritized as a focus of R&D spending.

Challenges related to subnational government budgets

Despite the central government's commitment to the education sector through the provision of additional funding, the subnational governments demonstrate poor use of this funding.

a. Only a few subnational governments are aligned with the central government's priorities to improve the quality of learning outcomes and they fail to allocate the 20% as mandated. Rather than utilizing the budget allocation to invest in ICT facilities, funding general teacher salaries is prioritized, impeding on local governments' financial capability to improve learning outcomes and support the digital development goals set out by the RPJMN. A critical obstacle to directing funds toward quality education initiatives is the limited progress and tracking of the allocated funding and associated spending.
b. Subnational governments have different levels of understanding of the policies directed by the central government due to capacity constraints and constant changes to the central government's policies. In addition, policy changes rarely incorporate past policy feedback based on either data or consultations with education stakeholders at the subnational government level, limiting the effectiveness of the new policy and the budget allocated to it.

Challenges related to research and development

Budget allocation for R&D is low at 0.23%, and digital innovation is not prioritized as the focus of this spending. Indonesia's R&D spending is below other middle-income countries, with other Southeast Asian countries such as Vietnam (0.5%) and Thailand (1%) allocating an average of 1.1% annually.[38]

a. The industry contribution to R&D spending is low at 8%, with the largest source of R&D funding coming from the government at 87.7%. Looking at comparator

[38] UNESCO Institute for Statistics, n.d.

countries, India's R&D spending totals 0.7% of its GDP with a 37.2% private sector contribution.[39] Most R&D funding in Indonesia is used by government institutions, mainly in local government ministry research units and higher education institutions. However, funding is spent inefficiently, with small budgets across a variety of research areas, which is limiting. This is, in part, attributable to low awareness around the benefits of digital transformation for the economy.[40]

b. According to the MoI, only 18 industries meet the targeted standards of the Indonesia Industry 4.0 Readiness Index (INDI 4.0). The goal is 222 industries by 2024.[41] R&D activities across the industries are mainly to upgrade or upscale products, rather than to mobilize business models using digital resources and platforms. For certain productive sectors, including agriculture and other non-services sectors, a lack of understanding around the benefits of digitization results in risk aversion and uncertainty in the spending of funds.

Example 5: Republic of Korea's experiences with its R&D budget

The Republic of Korea is the country with the highest budget allocation for R&D spending globally (73 trillion USD PPP or 4.5% in 2018).[42] The private sector contributes over 78% of the R&D budget, leaving the government responsible for minimal contributions.[43] The private sector's high R&D investment in the country enables all Korean firms to participate in digital transformation and boosts existing industries' uptake of core digital technologies. This effort highlights the huge focus that South Korea places on innovation. Combined with a highly skilled population, the high R&D investment has supported the Republic of Korea to make substantial progress in raising its economic growth since joining the OECD in 1996.[44]

Strategic interventions

To ensure a well utilized education budget that prioritizes expenditure on the development of quality education, and to ensure adequate budget allocation for

[39] UNESCO Institute for Statistics cited in World Bank, 2021b.
[40] Raised in the thematic workshop consultations hosted by SMERU between October and November 2021.
[41] The 2024 target for industries with INDI 4.0 standards is excerpted from the 2020-2024 Strategic Plan of the Ministry of Industry (MoI, 2020).
[42] UNESCO Institute for Statistics cited in World Bank, 2021b.
[43] UNESCO Institute for Statistics, n.d.
[44] OECD, 2017.

R&D. Discussion from the policy dialogues revealed five solutions. These interventions focus on ensuring adequate investment in education and innovation and are discussed in two categories: *firstly*, the subnational government budget and *secondly*, research and development spending.

1. Subnational government budget

a. ***Optimize the use of the Neraca Pendidikan Dasar (NPD) platform to monitor the subnational governments' spending of the budget allocated to the education sector and ensure that spending is 20% of the budget, as mandated.*** This solution was developed subsequent to the policy dialogue discussions, after considering available resources that could potentially be repurposed. Currently, the platform is used as a medium to display education statistics and to display the allocation of the education budget to each subnational government. Enhancing the NPD platform to track the spending of the allocated budget will enable subnational governments to better understand education outcomes. The following steps are suggested to optimize the use of NPD:
    i. The MoE must continue working closely with the Ministry of Home Affairs (MoHA) to ensure that the allocation of the education budget to each subnational government is as mandated, at 20%.
    ii. Ensure that the platform allows all education agencies from each subnational government to report their education budget plan through online channels. This will require the MoE to set submission deadlines for each district, city and province to report their budget allocation and spending on the platform each year. This could be earlier for districts/cities and later for provinces to ensure that the proper audit and feedback processes are performed.
    iii. Formulate a set of key performance indicators to ensure the effectiveness of education spending, including improvements in teaching and the quality of the ICT curriculum. This can be achieved by creating school profiles/reports based on the data reported on the platform and by conducting a National Assessment (AN) to measure educational outcome in the provinces and districts/cities.
b. ***Conduct regular meetings with education stakeholders at the subnational government level*** to discuss the central government's directed policies and to gather ideas on how to improve the quality of education. This solution was raised during the policy dialogue discussions as a co-design approach and is important

to allow all stakeholders (including the private sector and teachers) to be involved in the education policy-making process, including during budget planning, which will also drive towards alignment in understanding the policies. Lessons can be drawn from the implementation of the Merdeka Belajar program and the manner in which the program engages with stakeholders.[45] The Merdeka Belajar program has several stages/episodes, and each episode requires the involvement of education actors at the subnational level to produce innovations in classroom learning. Regular meetings with education stakeholders at the subnational level will ensure the efficient monitoring of how specific innovation initiatives have improved education quality, and will provide clear guidance on how education spending should be allocated to achieve further improvements.

2. R&D spending

a. ***Promote the super tax deduction program for companies/industries investing in R&D.*** This solution emerged during the policy dialogue discussions and focuses on creating awareness around MoF Regulation No. 153/ PMK.010/2020 which allows certain R&D activities, carried out by a taxpayer and focused on prioritized sectors, to qualify for a super tax deduction of up to 300%. This will encourage more R&D investment from the private sector, as companies will incur savings on R&D costs, based on qualifying conditions. In order to promote this existing initiative, the development of an integrated online single submission system (OSS/e-government system) is recommended, to monitor the activities of the super tax deduction program on R&D.
b. ***Provide technical assistance for selected industries*** to advance digital implementation. This solution will require the Ministry of Industry to provide technical assistance in the form of ICT facilities (computers, cloud computing services, digital printing, and so on) to support industries which aim to digitally transform their operations. To be in line with current government policies, the assistance will focus on the 7 strategic sectors prioritized for digitalization: agriculture; creative economy; education; financial inclusion; health; transportation/logistics; and tourism.
c. ***Establish a matching fund for more innovations in digital technology.*** This solution was developed during the policy dialogue discussions to incentivize the

[45] The Merdeka Belajar (Freedom to Learn) program is a MoE-led program that gives teachers more autonomy to transform their teaching and learning activities in class to achieve the goal of improvement in education quality (Shofa, 2020).

private sector to strengthen financial support for R&D and increase the social impact of research conducted by higher education institutions. This solution has the potential to boost digital transformation within industries by strengthening collaborations between academia and the private sector, with funding from the GoI.

i. The MoE should initiate this matching fund program in order that activities are not limited to seed funding for R&D, but also used to support the procurement of ICT facilities at schools, higher-education institutions, and training institutions.

Table 3 provides a summary of the key Investment in Innovation and Education actions to be undertaken as part of this strategy, with an indication of the time frame, responsible stakeholders and potential funding sources where applicable.

Table 3: Key Actions to Drive Investment in Education and Innovation

Objective: Ensure that the mandated 20% of education budget allocation is spent effectively by local governments and increase the national government budget allocation for R&D by 1.68% of GDP to advance ICT skills development, with contributions from the private sector to mobilize digital transformation.			
Actions required	**Time frame**	**Responsible stakeholders**	**Potential funding sources**
Optimize the use of the Neraca Pendidikan Dasar (NPD) platform to monitor that subnational government spending of the budget allocation for the education sector is as mandated, at 20%	Immediate	MoE; MoHA; regional governments	APBN; APBD
Conduct regular meetings with education stakeholders at the subnational government levels to discuss the central government directed policies and to gather aspirations on improving the quality of education	Medium term	MoE; MoHA; regional governments	APBN; APBD
Promote a super tax deduction program for companies/industries investing in R&D	Medium term	MoF; MoI	APBN
Provide technical assistance for selected industries to advance digital implementation in their businesses	Short term	MoI	APBN; International donors; University
Establish a matching fund for more innovation in digital technology	Short term	MoE	APBN; PPP; University

Source: Author

4.3. Policy Enabling Environment

Objective: Develop a holistic policy and governance framework to lead the vision and build a conducive environment for digital skills development in Indonesia.

The challenge

Although Indonesia has made progress in supporting digital transformation, there is an absence of a detailed policy framework and government capacity. The 2020-2024 RPJMN continues to emphasize the role of digital transformation in boosting economic productivity and improving service delivery for communities. However, the GoI lacks a comprehensive plan and the capacity to support the development of digital skills that are fundamental to implementing digital transformation.

Challenges related to the policy framework for digital skills

Despite the MCI preparing the 2020-2024 Indonesia Digital National Roadmap, there is no detailed policy framework for digital skills development. In addition, the RPJMN has no specific digital skills development targets, leading to a fragmented approach with ministries working in silos.

a. Although the MCI is mandated to implement several priority digital skills and digital literacy programs, there is no responsible party within the government that exists to coordinate and lead the overall digital skills development agenda. The MCI's current generic roadmap does not optimally accommodate the inter-ministry digital transformation agenda, leading to siloed operations which are not focused on achieving specific targets.[46] This is in part attributable to the lack of specific digital skills development targets in the RPJMN at the outcome level.

Challenges related to government capacity

The government's capacity to manage digital skills development remains limited. This is in part due to a lack of policies that stress the importance of digital skills for public servants to enable the implementation of a digital government, i.e., an Electronic-Based Government System (SPBE), and other digital transformation agendas.

a. There is a common perception among youth that working in the public sector is undesirable.[47]
b. Although the Ministry of State Apparatus Empowerment and Bureaucratic Reform (MoSAUBR) has developed an Electronic-Based Government System (SPBE) as a national framework to drive the public sector's digital transformation, the

[46] i.e., Making Indonesia 4.0 in the Ministry of Industry, Ecommerce roadmap in the Ministry of Trade, and Electronic-Based Government Systems (e-government) in the Ministry of State Apparatus and Bureaucratic Reform.
[47] Baidhowah, 2021.

framework does not include digital skills among public servants as a Key Performance Indicator (KPI). Therefore, current public servants have limited digital skills. The SPBE requires only two digital skills: computer operating skills and informatics skills, which only emphasize the mastery of Microsoft Office at the basic level. However, public servants require a mastery of more advanced digital skills in order to lead the country's digital transformation agenda.

Challenges related to national indicators for digital skills development

The GoI has not provided nationally representative indicators for digital skills development to track and match the supply and demand of digital talent, both within and outside the governmental sector. This limits the government's ability to ensure digital skill goals are achieved and prevents the government from being able to identify gaps in the supply and demand of digital skills. Currently, the Statistics Indonesia (BPS) does not track specific indicators for digital skills development, with existing surveys such as the SUSENAS and SAKERNAS excluding digital skills specific data. The BPS is responsible for providing ministries with official statistical data, allowing ministries to make informed decisions and formulate appropriate policies.

Strategic interventions

Several solutions are required to create a conducive environment for digital skills development in Indonesia. Discussions during the policy dialogues revealed six strategic interventions that focus on ensuring the availability of policy framework and capacity development tools that are represented at the national level. These interventions are discussed in three categories: *firstly,* a digital skills policy framework, *secondly*, the government's capacity, and *thirdly*, national indicators for digital skills development.

1. Policy framework on digital skills

a. ***Create a National Committee for Digital Acceleration (NCDA) to accelerate the digital transformation agenda in Indonesia.*** The creation of the NCDA platform will allow responsible parties (committee) to harmonize, organize, coordinate, and accelerate the digital transformation agenda in Indonesia. The committee will be responsible for determining digital skills development visions to accelerate the country's digital transformation, both within the government

structure and outside the governmental sector. The structure of the NCDA will comprise of members from each ministry with a human development and/or digital transformation agenda. The MCI will lead and coordinate Indonesia's overall digital skills development plan and issue a presidential regulation on the formation of the NCDA to bind commitments between the ministries. The concept of the NCDA will resemble that of the Digital Council of Thailand, as discussed in Example 6.

Example 6: Digital Council of Thailand[48]

Thailand established the Digital Council of Thailand, based on the Digital Economy and Social Council of Thailand Act, B.E. 2562 (2019). The council acts as a collaborative initiative among Thailand's government and private industries to structure and accelerate the country's overall digital transformation agenda. The council aims to raise the digital competitiveness of Thailand's businesses and industry to international levels and to improve the quality of the community's digital skills. To achieve these goals, the Digital Council of Thailand has six missions: (1) to establish the digital competitiveness of industries/businesses and citizens; (2) to build collaborations between government and private sectors; (3) to develop people's digital skills; (4) to develop the digital economy; (5) to become the innovation center of the region, and; (6) to build a digital society.

b. ***Develop a detailed policy framework for digital skills development***. This intervention emerged during the dialogue discussions, with a focus on the MCI incorporating the detailed policy framework as part of the digital people pillar in the Indonesia Digital National Roadmap. The framework developed in this strategy primer, as shown in Figure 2, is a valuable entry point to build a comprehensive digital skills policy framework. In developing policy frameworks, the MCI needs to provide specific objectives for digital skills development. For example, creating digitally literate citizens and digitally competent workforces, similar to the World Bank's Digital Skills Framework for Africa, as outlined in Example 7. These objectives need to translate into the main strategy to improve digital skills fundamentals, including formal education, vocational training, and on-the-job training.

[48] Digital Council of Thailand, 2020.

Example 7: World Bank's Digital Skills Framework for Africa[49]

When conducting the Digital Economy for Africa (DE4A) initiative, the World Bank proposed a digital skills development framework for Africa as one of the five foundational pillars. This pillar leverages one of the most influential and comprehensive digital skills frameworks is the European Union's DigComp. The DE4A has provided initial and potential strategies for two digital skills development agendas in Africa: the creation of digitally competent workforces and digitally literate citizens. Digitally competent workforces specifically targets productive-age citizens and discusses (1) skills for ICT professions and (2) skills for a broad range of occupations. This group is expected to help strengthen other foundational pillars of the digital economy in Africa by providing digital infrastructure and better-quality jobs. Digitally literate citizens addresses a whole range of citizens and mostly discusses (1) skills to use digital technologies and services in people's everyday lives, and (2) skills to facilitate learning, civic engagement, and health outcomes. This group has the ability to reap optimal benefits of the digital economy by gaining information and engaging with broader communities.

2. Government capacity

a. ***Improve the public servant recruitment process.*** This intervention was raised during our discussion with a Digital Government Expert from the World Bank Jakarta who pointed out that public servants, i.e., civil servants and non-civil servants, should be equipped with reliable digital skills to drive the implementation of e-government and other digital transformation agendas. The initiative is also expected to attract digital talents to work in the governmental sector. The MoSAUBR, as the party responsible for developing the e-government roadmap and for conducting annual national civil servant recruitment, may utilize the NCDA to improve the national public servant recruitment process in each ministry or institution. In order to improve the public servant recruitment process, two approaches must be considered:

   i. Collaborating with the MCI to improve the current job competency framework by enriching the GoI's job classification with various ICT occupations. This initiative will also accommodate each ministry's recruitment process of non-civil servants in certain periods. Creating various

[49] Bashir, 2020.

ICT jobs within the government will not only help to overcome the problem of a lack of digital skills talent to fill specific ICT jobs within the government, but also to attract younger generations to start their career in the governmental sector. Lessons can be drawn from the Jabar Digital Service explained in Example 8.

ii. Supporting other ministries in creating a better work culture: promoting an agile, informal, less bureaucratic, and less challenging work culture for public servants, attracting younger generations or experienced workers to employment in the governmental sector. Strategies can be learnt from Program Example 8, which outlines the Jabar Digital Service and Example 9, describing the Code for Canada Fellowship, below.

Example 8: The Jabar Digital Service (JDS), achieving digital maturity by equipping public servants with advanced digital skills.[50]

In 2019, the provincial government of West Java, Indonesia, under Governor Ridwan Kamil's administration, established the Jabar Digital Service (JDS). The JDS is a special government agency aimed at actualizing the mandate to enforce the digital transformation agenda in West Java Province and providing untapped opportunities for rural citizens to benefit from digital technology. The JDS is concerned with the quality of human resources as a core ingredient for successful digital transformation. It is committed to attracting the right digital talent—most of whom are young people with more advanced digital skills—to lead the digital transformation. The agency reformed the public sectors' branding by offering competitive commissions that are equivalent to the average salary of start-up companies, creating an agile or less bureaucratic working environment, encouraging young digital talents to work closely with the Governor, and enabling them to take a chance in creating a positive impact among the 49 million citizens across the province. The JDS also developed a wider ICT job classification, including UI researcher, UX researcher, data analyst, and so on, making digital transformation more efficient. As a result, the JDS has succeeded in developing an integrated platform that is able to accommodate the basic needs of the citizens of West Java, from producing birth certificates, business permits, and communication platforms with local governments, to empowering hundreds to thousands of villagers in West Java in using technology.

[50] Jabar Digital Service, 2019.

Example 9: Code for Canada Fellowship Program.[51]

In 2020, the Government of Canada (GoC) established the "Code for Canada Fellowship Program." Through this program, the GoC recruits many digital professionals from the private sector (the majority of whom are from promising start-up and ICT-based companies across the country) to work with the public sector in various government units. These fellows are responsible for helping the GoC change the public sector culture, modernize the recruitment process, and create specialized digital units aligned with the government's digital transformation agenda. Through this knowledge exchange concept, the GoC can scale up its recruitment mechanism to bring more digital talent into the government, both at the federal and provincial level.

b. ***Retain the existing employment and learning processes within the governmental sector.*** This intervention was raised during our interview with a Digital Government Expert from the World Bank Jakarta, who pointed out that the GoI is preparing to implement and optimize the e-government ecosystem through the readiness of digital skills talent within government ministries/institutions. The sustainability of working process, including work documentation, work procedures, and so on, should be improved in order to create an efficient and effective working approach. Two strategies must be considered:
    i. Incorporate digital skills within the government as one of the Key Performance Indicators (KIPs) of Indonesia's e-government national framework. The KPI may adapt the OECD's Framework for Digital Talent and Skills in the Public Sector, as shown in Example 10. The framework is a good reference to incorporate digital skills into current public servant upskilling or pre-promotion learning programs. By using the KPI, the GoI may also formulate specific targets for digital skills development within the government. One example that may be considered, which resembles Singapore's GovTech[52], is to create annual targets for public servants who are already equipped with digital skills in each ministry or institution.
    ii. Arrange a better transfer of knowledge or hand-over system. Most private sector institutions and startups in Indonesia provide one- or two-months notice before employees are discharged or promoted, leaving a vacant

[51] Aghdaee, Kou, and Craft, 2021.
[52] GovTech is a statutory board of the Government of Singapore, under the Prime Minister's Office. They are responsible for delivering the digital transformation agenda, not only to the government system, but also to the citizens.

position. During this phase, the employer searches for a replacement. After the selection process has been conduted, the discharged or promoted employee and/or the employer are responsible for sharing internal knowledge with the new employee to maintain the work documentation and work procedures of each position over the years.

Example 10: OECD Framework for Digital Talent and Skills in the Public Sector.[53]

This framework was conceived as guidance for the government in attracting the right talent and skills to drive digital transformation. Three pillars are covered in the framework. First, the "societal" pillar, which highlights how governments' leadership, organizational structures, learning culture, and ways of working support a conducive digital workplace environment. Second, the "organizational" pillar, which points out the need for digital era ways of working and skills, including digital skills classification, across the public sector. Third, the "individual and teams" pillar, which emphasizes the practical steps needed to ensure that the workforce is, and remains, sufficiently digital. This includes ICT job recruitment methods, career planning, workplace mentoring, and training.

3. National indicators for digital skills development

a. ***Develop an M&E framework to track digital skills development,*** which leverages digital skills data collected by BPS. This initiative focuses on the implementation of an M&E framework to improve the government's ability to track digital skills development in Indonesia. As the MCI is mandated to lead the digital skills development policy, the ministry is well placed to lead the development of this framework. The effectiveness of the M&E framework will be determined by the availability of data. The policy dialogue discussions highlighted the important role of BPS in providing nationally representative data on digital skills in Indonesia. BPS can provide digital skills specific data by conducting a specific survey to measure digital skills or by incorporating digital skills specific indicators into existing surveys, such as SUSENAS and SAKERNAS. The toolkit developed by CSIS, as discussed in Example 11 below, can be used as a reference to measure digital skills in Indonesia.

[53] OECD, 2021.

Example 11: Toolkit to measure digital skills[54]

CSIS, supported by Digital Pathways at University of Oxford, has developed a toolkit to measure digital literacy and skills. The toolkit has 32 indicators organized around four pillars: 1) Infrastructure and Ecosystem; 2) Literacy; 3) Empowerment; and 4) Jobs. The toolkit's indicators are developed from both primary and secondary data. The primary data sources include an individual survey using the self-assessment method to capture the level of individual's literacy and skills, while a firm-level survey reflects technological adoption of industry and its perspective on digital skills demand.

b. ***Develop a Digital Talent Management System (DTMS)*** to match the supply and demand of digital talent. This solution emerged from the dialogue, where the DTMS would aim to improve the GoI's ability to formulate specific strategies for emerging digital skills and ICT occupations. The DTMS will be a platform, managed by the Ministry of Manpower (MoM), to pool digital talent data, map trends related to digital skills demand, and provide information about digital skills training opportunities. To ensure its effectiveness, the MoM needs to enhance collaborations between job opportunity platforms and training institutions. Lessons can be drawn from the Moroccan National Digital Skills Framework, as discussed in Example 12.

Example 12: Morocco's National Qualification Framework Scan[55]

The Moroccan government developed the National Qualification Framework Scan as an instrument to map the current digital talent landscape, analyze future digital employability, and help the government provide strategic. The platform contains useful information regarding career paths, employment opportunities in emerging ICT occupations, as well as training programs for the upskilling and mastery of digital skills. The platform also provides information related to critical skill set requirements linked to each ICT job opportunity, which is compared to a corresponding job outlook in Morocco over the next two to five years to come. By utilizing this platform, government agencies, formal education graduates, unemployed individuals, and working professionals in Morocco are equipped to make informed decisions about career choices and take responsibility for digital skills upgrading and career planning.

[54] CSIS, forthcoming.
[55] Huawei, 2021.

Table 4 provides a summary of the key Investment in Policy Enabling Environment actions to be undertaken as part of this strategy, with an indication of the time frame, responsible stakeholders and potential funding sources, where applicable.

Table 4: Key actions to drive the Policy Enabling Environment

Objective: Develop a holistic policy and governance framework to lead the vision and build a conducive environment for digital skills development in Indonesia.			
Actions required	**Time frame**	**Responsible stakeholders**	**Potential funding sources**
Create a National Committee of Digital Acceleration (NCDA) in Indonesia	Immediate	MCI	APBN
Develop a detailed policy framework of digital skills development	Short term	MCI	APBN
Improve the public servant recruitment process	Long term	MoSAUBR	APBN
Retain existing employment and learning processes within the governmental sector	Medium term	MoSAUBR	APBN, PPP
Develop a monitoring and evaluation (M&E) platform to track digital skills development	Short term	MCI, BPS	APBN
Develop a Digital Talent Management System (DTMS)	Medium term	MCI, MoM, MoE	APBN, PPP

Source: Author

5. Channels

The strategic channels for digital skills development are direct mechanisms for Indonesia to improve the digital literacy of its citizens and the digital competency of its workforce, in an effort to achieve the economy's broader goals of boosting the digital economy and job creation. The most critical challenges and necessary strategic interventions intended to address these challenges are presented in three main channels within this section.

Formal education, vocational training, and on-the-job training are the three most important channels that will help develop the country's interrelated digital skills objectives.

- Formal education provides foundational skills to improve citizens' and workers' digital literacy and digital competency, through basic, secondary, and vocational/higher education. Vocational education (provided by vocational schools, including SMKs, polytechnic colleges, academies, and other vocational higher education institutions under the MoE) is categorized in this channel as it has a systematic curriculum structure, and the programs can last for two years or longer.
- Vocational training is a flexible and inclusive channel to upgrade the digital skills of citizens and the workforce, outside of formal education. Vocational training differs from vocational education as it includes tailor-made training programs for work purposes with a more flexible curriculum (provided by training institutions, with vocational training usually managed by the MoE for public training institutions), and the programs can be completed in 1-2 days of training.
- On-the-job training is a systematic and purposeful channel to re-skill and up-skill the digital competency of both formal and non-formal workers. On-the-job training includes training programs for new-entrant workers and MSMEs.

Focusing on these channels will improve the current state of Indonesia's digital literacy and competency measured by increased PISA reading scores and by the number of digitally skilled workers. Currently, digital literacy in Indonesia remains relatively low, as indicated by its scores in several aspects of basic literacy required for digital development; 30% of students exhibited a minimum level of proficiency (level 2 or higher) in reading, compared to the OECD average of 77%. The state of digital competency reflects a similar pattern, with more than half of workers being unskilled or possessing only basic digital skills, while workers with intermediate and advanced digital

skills represent less than 15% of the population. Addressing challenges within formal education serves as an important channel to increase both PISA scores and the number of workers with intermediate and advanced digital skills. Furthermore, addressing challenges in vocational and on-the-job training is also required to increase the number of workers with intermediate and advanced digital skills.

5.1 Formal Education

Objective: Achieve the RPJMN target of 36% of students with PISA reading scores at level 2 proficiency by 2024 and have 50% of the workforce possess intermediate and advanced digital skills by 2024, up from ~13%.

The challenge

Current formal education in Indonesia does not adequately improve students' performance in basic digital literacy nor does it equip them with intermediate digital skills that are useful for work. Based on the 2018 PISA Survey, only 30% of students in Indonesia have a higher score than level 2 proficiency.[56] When examining neighboring countries, Malaysia has achieved 54% of students with higher than level 2 proficiency, while Thailand has achieved 40%.[57] Indonesia's poor reading assessment scores indicate that Indonesian students have a low capability to distinguish facts from opinion, and poor reading strategies to assess the credibility of sources. Moreover, our diagnostic report revealed that Indonesia is dominated by digitally unskilled workers (67 million in 2020), with intermediate (18 million in 2020) and advanced skilled workers (880 thousand in 2020) only representing a small percentage.

Achieving the GoI's target of obtaining 36% of students with higher than level 2 PISA reading scores and having 50% of the workforce possess intermediate and advanced digital competencies by 2024 requires improving access to quality formal education. Formal education is essential to develop students' digital capabilities and prepare them to be digitally competent workers in the future.

[56] According to Kurniawati and Suryadharma (2019), Indonesia's PISA scores did not significantly increase over the last decade. Only 24.6% of students had a PISA reading proficiency higher than level 2 in 2015; 25% in 2012; and 24.7% in 2009.
[57] OECD, 2019.

There are three key challenges influencing this: 1) access to formal education, 2) the quality of the curriculum and 3) the quality of teaching staff.

Challenges related to access to formal education

Education policies in Indonesia have been successful in increasing participation at the primary level.[58] However, social inequality, income inequality and geographical challenges, especially outside Java, prevent people from accessing and continuing on to secondary and tertiary education.

a. Eleven percent of all senior high school graduates come from low-income groups, with 32% from the highest income groups. Only 4% of all university and college graduates come from low-income groups compared to 61% from the highest income groups.[59] Access to senior high school and higher education is smaller for students from low-income groups than for students from high-income groups.
b. The GoI has developed the "Smart Indonesia Card *(Kartu Indonesia Pintar/KIP)* Program" to ensure that all school-aged children from low-income communities are able to access formal education. Unfortunately, this program appears to be unsuccessful in targeting students from low-income families. In 2020, the GoI targeted 5.3 million students from low-income families to benefit from the program. However, as of 2020, 2.4 million students from low-income groups still did not benefit from the educational financial aid service.[60] The selection of KIP beneficiaries is based on two data sources: the Ministry of Social Affairs' (MoSA) database (Integrated Social Welfare Data/DTKS) and the MoE's database (Basic Education Data/Dapodik). There is limited information sharing between these institutions, which leads to mistargeting of the KIP beneficiaries. As a result, without sufficient educational funding assistance services, many students from low-income groups face the risk of losing their opportunity to participate in formal education.

Challenges related to the quality of the curriculum

a. At the primary and secondary level, the current 2013 curriculum (K13) does not effectively improve students' basic digital literacy. Before 2013, ICT subjects were categorized as compulsory subjects. After the implementation of K13, ICT was no longer included as a stand-alone compulsory subject. The goal of K13 was to

[58] Beatty et al., 2018.
[59] Data processed from the National Socioeconomic Survey (Susenas) 2011–2020.
[60] Audit Board of Indonesia (BPK), 2021.

integrate ICT into other subjects. However, this objective was not effectively implemented, reducing the opportunity for students to learn ICT at school, and impeding their mastery of basic digital literacy. Furthermore, the K13 does not equip students with a holistic understanding of ICT, leading to low interest in pursuing ICT studies at higher levels of education.[61]

b. At the tertiary level, the vocational ICT school and college/university curriculum is not in line with current digital trends and industrial needs. The current curriculum focuses on equipping students with foundational skills, such as basic coding, without including analytical skills, critical thinking, or problem-solving abilities. Both technical skills and soft skills are essential to produce workers with advanced digital competencies.

Challenges related to the quality of teaching staff

The limited availability of quality professional education programs (e.g., training, internships, and opportunities to pursue higher levels of education), leads to low quality teaching staff at the formal education level. Two types of mandatory training are provided by the GoI to improve teacher quality: pre-service training (before teachers receive their teaching license) and in-service training (after teachers officially possess a teaching certification). Pre-service training includes "Initial Teacher Education Training" for those who are looking to become a teacher and "Induction Training" for early-career teachers. Meanwhile, in-service training includes "In-career Development Training" for teachers who already hold a teaching license and are focused on improving their teaching capacity.[62]

a. At the primary and secondary level, most training programs do not equip teachers with the pedagogical knowledge to deliver and formulate ICT learning materials or the skills to teach High Order Thinking Skills (HOTS), especially to implement ICT subjects across all school subjects. As a result, teachers are unable to incorporate ICT into their lessons.
b. At the tertiary level, only few lecturers have doctoral degrees. Although scholarships are available, only few lecturers meet the criteria. Furthermore, lecturers at vocational institutions and universities do not recieve sufficient opportunities to improve their expertise through training, internships, and research and development (R&D) activities. In addition to not being equipped with sufficient funding, they are burdened by administrative matters as Indonesia's higher

[61] Raised in the thematic workshop consultations hosted by SMERU between October and November 2021.
[62] Revina, 2019.

education system obliges them to teach, conduct R&D activities, and carry out community development. This approach is different to several other countries, including Australia and the UK, which allow lecturers to specialize in research and have a low teaching load.

Strategic interventions

To expand access to and improve the quality of formal education a number of interventions are proposed. These interventions are organized into three categories: *firstly*, access to formal education; *secondly,* quality of the curriculum; and *thirdly,* quality of teaching staff.

1. Access to formal education

a. ***Optimize the existing "Smart Indonesia Card (Kartu Indonesia Pintar/KIP)" program*** which targets students from low-income groups. This intervention emerged from the dialogue discussions with agreement that the KIP program can be improved by implementing the following changes:
   i. Conduct regular database updates of low-income students by establishing collaboration between the MoSA and the MoE. By strengthening coordination between its ministries, the GoI can effectively target students from low-income families to benefit from the educational fund's assistance services.
   ii. Expand the beneficiaries of KIP to include ICT students (enrolled in the fields of computer science, information systems, computer engineering, and so on), especially those who live in areas with a high demand for ICT professionals. At present, the majority of KIP beneficiaries are vocational students of agriculture, animal husbandry, forestry and shipping.

2. Quality of curriculum

a. ***Expand the scope of ICT learning at the primary and secondary level.*** This solution was raised during the workshops to provide a more holistic understanding of ICT learning and prospects among students. By implementing this intervention, students will gain a clear picture of the broader scope of ICT prospects, leading to a higher interest in learning ICT. In implementing this intervention, several steps must be considered:

i. Revise Law Number 37/2018 on the education curriculum for developing students' digital capabilities to include basic digital literacy. The GoI can implement the MCI's digital literacy module into the MoE's curriculum to update this regulation. The government aims to incorporate a digital literacy subject to teach fundamental digital skills at the primary and secondary education levels.
ii. Provide information on the benefits of pursuing an ICT major at the primary and secondary levels. This can be achieved by establishing collaborations with universities and polytechnics in order to deliver guest lectures by ICT professionals, ICT-based extracurricular activities, and ICT competitions like Hackathons.

Example 13: The "Code Lagos" initiative in Nigeria has successfully expanded the scope of ICT learning and prospects among students at the primary and secondary level[63]

"Code Lagos" is an annual ICT competition and training program that aims to encourage students in primary and secondary education to take an interest in computer programming and to improve technology to make a positive impact in the state of Lagos, Nigeria. The initiative is part of a mandate issued by Governor Akinwumi Ambode's administration (2015-2019) to train one million Lagosians to code by the year 2030. Prior to participating in the "Code Lagos" competition, students in primary and secondary education receive training (in the form of extracurricular activities) on logical learning, deep thinking, and programming (coding), as well as broader exposure to ICT. Those out of primary and secondary education are also able to receive training in Java and Python programming languages, HTML, and CSS with 50 ICT centers across the province. In 2018, 1,500 schools in Lagos had already been exposed to free coding training, 337 schools had regular coding classes, and over 1,340 Lagos residents were trained in ICT. Furthermore, thousands of students from hundreds of schools in the state of Lagos have participated in the "Code Lagos" competition since 2018. The students have developed various ICT products aimed at improving the quality of people's lives, including a mobile app called "Recycle It" initiated by Badagary Senior High School students (the 2018 winner), which aims to enhance waste management in Nigeria.

[63] Akinpelu, 2018.

b. ***Improve the effectiveness of the "Kampus Merdeka" program*** to present high-quality apprenticeship opportunities to students at the tertiary level. This intervention emerged during the dialogue discussions, in which stakeholders suggested the program as a strategic intervention to improve students' digital capacity. The program enables students to explore their interests–especially in the digital technology field—through various programs, including student exchanges, research, independent projects, apprenticeships, and so on. For the apprenticeship program, students can leverage their digital skills by undertaking work experience in certain ICT industries/companies for 1-3 semesters (equivalent to 20 credits). To improve the effectiveness of the program in equipping students with digital skills aligned with industry demand, the GoI should consider several actions:
    i. Formulate a syllabus based on the apprenticeship key performance indicators (KPI). The syllabus will be a tool for assessing student performance during the program. It also aims to narrow the mismatch between the education curriculum and industry demand.
    ii. Provide mentors to monitor and ensure that students are able to implement their skills according to industry needs.
    iii. Provide a competitive salary and health insurance for apprenticeship participants based on Law No. 13/2003 on the issue of employment in Indonesia.[64] In addition to meeting their basic needs, this would also serve to attract students' interest in participating in apprenticeship programs.
    iv. To make sure that industries participate in the Kampus Merdeka program, the MoF should promote incentives (e.g., a regulation of an up to 200% tax deduction off industry's gross revenue for industries with workforce upskilling programs for vocational school students).

c. ***Develop an occupational-based ICT curriculum by establishing collaborations with the private sector.*** This intervention was raised during the policy dialogue discussions and aims to narrow the skills gap between the curriculum and industry requirements. Several actions are required to implement this intervention:
    i. Map current industrial needs and integrate them into the Indonesian National Performance Competency Standards (SKKNI). For this process, vocational institutions and universities are required to collaborate with the private sector to ensure that the curriculum formulated is aligned with industry demand.

[64] Raised in the thematic workshop consultations hosted by SMERU between October and November 2021 and confirmed during the consultation with ILO Indonesia on the quality of apprenticeship.

ii. Establish new majors and courses in vocational institutions, complemented by effective learning modules. This action takes into consideration that vocational graduates need to adapt to the fast-moving ICT industry more quickly. Moreover, the ICT curriculum in vocational institutions is more flexible than in universities.

3. Quality of teaching staff

a. ***Provide training in methodological skills*** to deliver teaching materials (pedagogy) and substantive abilities (ICT curriculum understanding) for teachers at the basic and secondary levels. This intervention was raised during the dialogue discussions and is necessary considering that teachers are the primary actors responsible for delivering the curriculum. This intervention can be implemented by optimizing pre-service and in-service training. As mandatory training programs for teachers, these programs are a key opportunity to equip teachers with the pedagogical skills needed to deliver ICT materials and the ability to understand the ICT curriculum. The training materials should include basic digital literacy and High Order Thinking Skills (HOTS). The training programs must also equip teachers with the ability to formulate learning materials and deliver ICT materials in a more interactive way, for example by creating interactive videos to make it easier for students to understand the learning materials.

b. ***Improve the expertise of lecturers at vocational colleges/universities.*** This intervention was raised during the workshops to provide high-quality professional education opportunities to lecturers, including training, internships, and opportunities to pursue higher levels of education. Several actions are required to implement this intervention:

   i. Optimize the "8 Episode Merdeka Belajar" Program as an opportunity for lecturers to pursue a doctoral degree through the Indonesian Endowment Fund for Education (LPDP). Through this program, the GoI has committed to expanding the benefits of the LPDP Scholarship to teachers and lecturers at all educational levels in Indonesia. The program represents a promising opportunity to increase the number of lecturers with a doctoral degree.

   ii. Involve lecturers as participants in professional internship programs and R&D activities with companies/private sector institutions to enhance their practical experience. This intervention can be achieved by establishing collaborations between vocational colleges/universities and corporations. During the program, lecturers will be exposed to the current challenges that

companies face and will have the opportunity to come up with solutions. These practical experiences will enable them to contextualize the current industry situation in the learning process.

iii. Provide training for lecturers to master ICT through a "Digital Talent Scholarship" program. This program should be initiated by the MCI which provides various ICT-related training programs at all levels. Educational institutions must collaborate with the MCI to prioritize training to improve lecturers' skills.

Table 5 provides a summary of the key actions to drive formal education to be undertaken as part of this strategy, with an indication of the time frame, responsible stakeholders, and potential funding sources where applicable.

Table 5: Key actions to drive formal education

Objective: Achieve the RPJMN target of 36% of students with PISA reading scores at level 2 proficiency by 2024; have 50% of workers possess intermediate and advanced digital competencies by 2024, up from ~13%.			
Actions required	**Time frame**	**Responsible stakeholders**	**Potential funding sources**
Optimize the existance of the "Smart Indonesia Card *(Kartu Indonesia Pintar/KIP)*" program	Immediate	MoE, MoRA, MoSA	APBN
Expand the scope of ICT learning at the primary and secondary level	Medium term	MoE, MoRA, MCI, regional governments	APBN; APBD; PPP
Improve the effectiveness of the "Kampus Merdeka" program	Medium term	MoE, MoI	APBN; PPP
Develop an occupational-based ICT curriculum by establishing collaborations with private sector institutions	Medium term	MoE, MoI, MCI	APBN; PPP; Universities
Provide training in methodological skills	Short term	MoE, MoRA, regional governments	APBN; APBD
Improve the expertise of lecturers at vocational colleges/universities	Short term	MoE, MCI	APBN; PPP; Universities

Source: Author

5.2 Vocational Training

Objective: Improve the quality of public training institutions/*Balai Latihan Kerja* (BLKs) in ICT and expand access to private ICT training institutions to support the goal of 50% of the workforce having intermediate and advanced digital competencies by 2024, up from ~13%.

The challenge

Vocational training is another important channel for digital skills development, especially in achieving the objective of 50% of workers having intermediate and advanced digital skills by 2024. Graduates from vocational training institutions are expected to be work ready. Different from vocational education, vocational training is conducted with flexible, practical, and functional principles. The graduates benefit directly from the training organized. The curriculum can also be evaluated according to industry needs. There are two types of vocational training institutions based on ownership: public and private. In preparing a digitally ready workforce, the quality of public training institutions (BLKs) and affordable access to private training institutions that provide tailor-made ICT programs are major components in establishing a digitally compotent workforce.

Challenges related to the quality of public training institutions (BLKs)

The quality of ICT graduates from BLKs is insufficient for industry standards due to a lack of relevant ICT courses offered during the programs. Three issues were discussed during the policy discussions related to the lack of relevant ICT courses offered in BLKs:

a. For central government owned BLKs (UPTPs), the implementation of the Reorientation, Revitalization, and Rebranding (3R) Program led to the elimination of ICT courses in some UPTPs as the GoI focused on courses with high industry demand, including automotive, textile/garment, and electronics courses. For subnational government owned BLKs (UPTDs), the focus of ICT as a major course depends on the prioritized agenda of each subnational government to actively participate in the digital economy. 70% of all UPTDs in Indonesia have ICT courses. However, only 30% of these are accredited. This indicates that the ICT courses offered at UPTDs are not prioritized and do not fully align with the national goal to produce high-quality workers.
b. The ICT curricula in BLKs do not match the overall industry demand due to lacking industry participation in curriculum changes. In setting up the curriculum, BLKs conduct a training need analysis (TNA) which is a crucial stage of training implementation. This stage aims to identify market needs as a basis for the

provision of relevant training materials, adequate training facilities, and qualified training instructors. However, from the demand side: a) most industries in Indonesia are micro, small, and medium sized, and do not have the resources to hire ICT trained workers, and b) large industries do not see the business development benefits of having ICT workers. These obstacles hinder industries' active participation in TNA.

c. BLKs have a low supply of experienced ICT training instructors. Only few ICT training instructors in BLKs (UPTPs and UPTDs) have expertise in the ICT field, and are industry professionals. The MoM has allocated resources to upgrade the competencies of instructors through training for instructors. However, the budget allocation is limited. Opportunities for upskilling through programs outside of the MoM also depend on the individual motivation of the instructors to: a) adapt to current skills trends, and b) access information on upskilling opportunities, as well as c) their financial ability to participate in upskilling programs.

Challenges related to access to private training institutions

Workers face relatively high costs to participate in private training institutions, which limits the opportunities available to them to enhance their digital skills. The expense includes actual costs (i.e., admission, transportation, and supplies), and opportunity costs (i.e., leaving their existing job to participate in 2-3 days of training). Upskilling activities at private training institutions generally provide better-quality training that helps workers to increase their digital capacity. The programs offered are also more relevant to industry as the more graduates employed by industry, the more reliable private training institutions are in producing quality workers.

Strategic interventions

To improve the quality of ICT training in government-owned training institutions and to expand access to private ICT training institutions, several initiatives are proposed. These will assist the economy and responsible stakeholders in achieving a 50% intermediate and advanced digitally competent workforce by 2024. These interventions are in line with the 2020-2024 RPJMN and prioritize the opening of channels for digital skills development in Indonesia.

1. Quality of public training institutions (BLKs)

a. ***Accelerate the provision of competency standards, training agendas, and certification for emerging ICT occupations.*** This solution was raised in the policy discussions to ensure the effective role of Reorientation, Revitalization, and Rebranding (3R) and Three-In-One (training, certification, and placement) programs in contributing to the provision of ICT workers. Through the acceleration of these initiatives for emerging ICT occupations, BLKs will rebrand ICT as a compulsory basic course for their training programs. The MoM must work with industry on ICT demand mapping to support the acceleration of competency standard development. The standards will form the basis for designing training agendas and assessment for certification.

b. ***Prepare a guideline and incentives for industries to become involved in competency standard development***. This initiative was raised during the policy discussions to ensure that the competency standard development instigated by the MoM is effective in responding to industry demands. The guideline allows industries to determine emerging ICT occupations and categorize them into specific skillsets. These industry-required specific skillsets will become the basis for the MoM in developing the competency standards. To make sure that industries participate in the competency standard development, the MoF needs to promote incentives (e.g., the regulation of an up to 200% tax deduction off industry's gross revenue for industries that participate in workforce upskilling programs).

c. ***Work with ICT training vendors, higher education institutions, industries, and the MCI in the provision of quality BLK-ICT instructors*****.** This intervention was raised during the policy discussions, with all participants mentioning that there is a need to increase the ICT expertise of BLKs instructors. For current BLK instructors, the proposed activities include participating in online training provided by ICT training vendors. The MCI also needs to consider prioritizing BLK instructors as targets for the Digital Talent Scholarship. To involve more experts in the BLK-ICT training, BLKs must work with higher education institutions and industries to facilitate their graduates or professionals conducting training in BLKs.

2. Access to private training institutions

a. ***Conduct ICT training for workers from low-income families*****.** This solution was raised during the policy discussions to allow more workers from different

backgrounds to have access to private training institutions. For this solution to work the MoM must:

i. Work with the MoSA to identify workers from low-income families. The targeted workers can be identified through beneficiary data from the KIP or Family Hope Program (PKH), which target productive age family members from low-income groups.
ii. Consider a co-financing scheme or matching fund initiative to invite more private training institutions to participate in ICT training programs for low-income families. In this scheme, the MoM provides a website-based platform for private training institutions to upload free ICT training materials. One example is the Pre-Employment Card/Kartu Prakerja website, where private training partners of the program are allowed to upload free ICT training materials.
iii. Work with industries to integrate digital skills training with industrial employability. This initiative aims to incentivize more private ICT training institutions to participate in the provision of free ICT training materials and to incentivize more low-income workers to upgrade their ICT skills due to employability. The integration must consider the use of Karirhub in order that it can be used as a labor market solution for industries/employers looking for ICT workers and job seekers looking for ICT jobs.

Example 14: Pre-Employment Card/Kartu Prakerja and Karirhub

The Pre-Employment Card/Kartu Prakerja program is a training program launched by the GoI in April 2020 to increase the competency of its workers. The program was initially designed to develop worker competencies, increase productivity and competitiveness, and develop entrepreneurship. Due to the pandemic, the program became an assistance program to provide incentives for laid-off workers/laborers, job seekers, and MSME actors who had lost their jobs and/or experienced a decline in purchasing power due to the COVID-19 pandemic to participate in online training activities provided by private training institutions (a list of the training opportunities provided can be accessed via the Prakerja website platform: https://prakerja.go.id). Karirhub, on the other hand, is a labor market portal service managed by the Ministry of Manpower, which provides a list of vacancies available to job seekers. This service brings together industry and individual employers to advertise vacancies. Job seekers can access vacancies via the website platform (https://karirhub.kemnaker.go.id).

Table 6 provides a summary of the key vocational training actions to be undertaken as part of this strategy, with an indication of the time frame, responsible stakeholders and potential funding sources where applicable.

Table 6: Key actions to drive vocational training

Objective: Improve the quality of public training institutions/Balai Latihan Kerja (BLKs) in ICT and expand access to private ICT training institutions to support the achievement of 50% of the workforce with intermediate and advanced digital competencies by 2024.			
Actions required	**Time frame**	**Responsible stakeholders**	**Potential funding sources**
Accelerate the provision of competency standards, training agendas, and certification for emerging ICT occupations	Immediate	MoM; regional governments	APBN; APBD
Prepare a guideline and incentives for industries to become involved in competency standard development.	Short term	MoM	APBN
Work with ICT training vendors, higher education institutions, industry, and the MCI in the provision of quality BLK-ICT instructors.	Short-term	MoM; MCI	APBN; APBD; PPP; Universities
Conduct ICT training for workers from low-income families.	Medium term	MoM; MoF	APBN; PPP; International donors; Universities

Source: Author

5.3 On-the-Job Training

Objective: Improve access to On-the-Job Training, in both the formal and informal sectors to support the achievement of 50% of the workforce with intermediate and advanced digital skills by 2024, up from ~13%.

The challenge

The implementation of On-the-Job Training to improve digital skills is limited in both the formal and informal sectors. OJT for newly-hired workers is limited to large companies, including well-known State-Owned Enterprises (SOEs) and private companies. OJT is usually conducted as a large-scale training program and provided to formal workers with fixed and longer-term contracts. Workers with informal jobs in Micro, Small, and Medium Enterprises (MSMEs) generally have limited access to training programs that use digital tools.

Challenges related to OJT in the formal sector

Although new employees in the formal sector may have better opportunities to access systematic OJT, there are still limitations. Two main issues were discussed in the dialogue workshops related to the lack of formal sector OJT programs:

a. Companies need to allocate more funds if they want to conduct systematic and sustainable OJT programs. There are two main reasons for the high cost of providing OJT programs. *Firstly*, the duration and the continuity of holding an OJT program. In a well-organized company, it typically takes at least 8-12 months to complete an OJT program for a batch of new employees. *Secondly*, new employees who receive OJT may demand similar types of employment benefits to those of experienced employees even though they have no proven experience in a similar working environment.
b. ICT modules are still not commonly included as part of OJT programs. There are two main reasons for this: *Firstly*, large non-tech companies mostly provide managerial training to improve leadership skills. Providing ICT technical skills training in their environment, both at the basic and intermediate/advanced level, is still considered trivial. *Secondly*, large tech companies rarely recruit entry-level workers. They prefer to recruit experienced workers who have proven that they are able to handle advanced and complex technological systems. However, it is still important to conduct OJT due to different technological systems being utilized across companies.

Challenges related to digital adoption among MSMEs

MSME business owners and their employees struggle to deploy training programs and where deployed, they struggle to maintain the use of digital tools post-training. Two issues arose in the policy discussions regarding this point:

a. There are no large-scale and comprehensive inter-ministry and/or inter-industry training programs to improve the acceleration of MSMEs' digital adoption. Although there are 18 ministries in charge of MSME programs, several of which pay attention to MSMEs' digital adoption, each tends to organize standalone programs that target specific groups and sectors, causing digital divides between the regions, especially outside of Java and in rural areas. The 2020 Financial

Inclusion Insights Survey shows that the proportion of digital adoption among firms in Java and urban areas is much larger than in rural areas.[65]

b. Even though MSME business owners and their employees already possess basic digital skills to digitalize their business operations, this does not mean that they will implement their skills to improve their business processes, for example, digitalizing administration processes, or selling products using ecommerce platforms. The 2020 survey on Financial Inclusion Insights shows that although nearly half of Indonesia's MSMEs have smartphones and are capable of using the internet, only 17% of MSMEs have previously used an ecommerce platform.[66]

Strategic interventions

To expand access to OJT programs for new entrants in both the formal and informal sectors, several solutions are proposed. These solutions are discussed in two categories: *firstly*, OJT in the formal sector and *secondly,* MSMEs' digital adoption.

1. OJT in the formal sector

a. ***Develop employment tax incentives***. This intervention emerged during the dialogues. Financial constraints on conducting annual OJT programs should be reduced. The GoI may formulate a regulation for employment tax incentives similar to South Africa's Employment Tax Incentive outlined in Example 15. This can be achieved by making several revisions to MoF Regulation No. 128/2019 on the Super Tax Deduction Program for industries to participate in workforce upskilling programs. Currently, the regulation does not specifically address OJT participants, only vocational schools and training participants. This revision can be designed to support the implementation of industry-based OJT programs. The regulation will stimulate companies offering entry-level job opportunities and recruiting new entrants by providing incentives for companies using the government budget, for example, providing tax savings of up to 200% on companies' expenses for conducting OJT, including providing OJT facilities.

[65] JPAL SEA, 2021.
[66] JPAL SEA, 2021.

Example 15: South Africa's Employment Tax Incentive[67]

The Employment Tax Incentive (ETI) is an incentive to encourage employers to hire young job seekers in South Africa. The program is currently running, having been implemented on 1 January 2014 and is expected to end on 28 February 2029. The incentive is provided for 24 months after a new employee is recruited. A number of conditions must be met for the employer to be eligible to claim the ETI. *Firstly*, the employer must be registered for Employees' Tax (PAYE/Pas-As-You-Earn). *Secondly*, the employer may not be in the national, provincial, or local sphere of government. *Thirdly*, the employer may not be a public or municipal entity. *Fourthly*, the employer may not have been disqualified by the MoF due to the displacement of an employee or for any other reason. In addition, there are several requirements to determine qualified employees. *Firstly*, they should have a valid South African ID, Asylum Seeker permit, or other relevant form of ID. *Secondly*, they should be between 18 and 29 years old. *Thirdly*, they may not be a domestic worker or personally connected to the employer. *Fourthly*, they must have been employed on or after 1 October 2013. *Fifthly*, they must be paid the minimum wage of at least R2000 per month. By using the ETI, companies can reduce the cost of hiring young talents by utilizing a cost-sharing mechanism with the government. The amount received through the incentive is double the total wage of the new employee. This incentive can help facilitate companies to provide existing programs with similar objectives, for example learnership programs to provide work-based learning that is directly related to specific jobs or field of works. Companies may re-apply for the incentive once the previous program installment has been completed.

b. ***Integrate training vendors' input on digital skills training into current OJT programs.*** This solution was raised during our dialogues, with participants suggesting that companies may complement current OJT programs with ICT modules by collaborating with training vendors. Training vendors may also assist to formulate or recommend distinctive and comprehensive OJT designs and facilities: coaches, teaching methods, buddy/mentor's preferred qualifications, training modules, evaluation forms for new employees, and certification process. Thereby, they can improve the overall success of OJT programs, from input to output, and help companies to achieve better outcomes when hiring new employees. Taking into consideration the type of company and the new employee's position, the training modules can be divided into two categories:

[67] South African Revenue Service, 2021.

i. Those that offer basic ICT technical skills modules in OJT to improve basic digital skills. These modules can be provided by qualified public or private training institutions. To accelerate digital transformation in all types of companies, current managerial training modules need to be supplemented with ICT technical skills for the purpose of improving employees' digital skillsets. All of a company's employees, particularly those in non-digital job roles, need to be introduced to compulsory digital tools to optimize office productivity, for example, office suite, including word processor, spreadsheets, presentation programs, databases, e-mailing client, and video conferences.

ii. Those that offer role-based ICT technical skills modules in OJT to improve employees' intermediate and advanced digital skills. For job roles in tech companies with higher exposure to utilizing digital tools, basic ICT technical skills modules should be complemented with role-based ICT technical skills modules. Providing role-based modules aims to improve new employees' experiences and exposure to selected digital tools based on their respective roles, for example, data analysts should be equipped with various statistical and programming tools, including R, Python, and SQL.

2. MSMEs' digital adoption

a. ***Develop a large-scale and extensive training agenda for MSMEs.*** This intervention was raised during our dialogues. Current training programs for improving digital adoption in MSMEs are still scattered across ministries and industries, creating small-scale training agendas that are exclusive to specific MSME characteristics, for example those operating inside Java or in urban areas. A large-scale and extensive training program for MSMEs will be essential in improving the inclusiveness of the MSME digital adoption agenda for all businesses with various socio-economic and demographic statuses. The program can be implemented by utilizing cross-sectoral Project Management Officers (PMOs) of MSMEs at the national level, an initiative which is currently being planned by the GoI. National PMOs of MSMEs will be a governmental unit outside of the Ministry of Micro, Small, and Medium Enterprises (MoSMEs), which is expected to lead the overall inter-ministerial and inter-industry agenda for digital adoption in the MSME environment, including the training agenda to improve human development in MSMEs. The approach will be similar to the SME Training Consortium in Korea, as outlined in Example 16. Several steps must be conducted

before and during the implementation of the large-scale training program for MSMEs:

i. Synchronize all ministerial policies to accelerate digital adoption among MSMEs to achieve one common vision: the creation of 30 million go-digital MSMEs by 2024 through a specific set of training priorities. The training agenda should focus on improving seven strategic sectors prioritized for digitalization, as mentioned in the previous section, particularly in the MSME environment.

ii. Appoint PMO representatives at the regional level to accelerate digital adoption among SMEs in disadvantaged areas, including outside of Java and in rural areas. Similar to PMOs for the tourism sector at the regional level[68], PMO representatives for MSMEs may assist national-level PMOs to coordinate with MSME agencies and other relevant parties in order to collect specific data on certain regions. The data will be used to assess the region's potential in creating specific industrial clusters of MSMEs in respective regions and to formulate specific strategic interventions. The data may also assist both national and regional PMOs to provide in-demand training for MSME players.

iii. Develop industry partnerships to create extensive sectoral training programs for MSMEs based on the assessment of PMO representatives regarding each region's potential for MSMEs and in-demand training. Industries have played a significant role in improving the quality of MSMEs in recent years. They have had a greater impact than the government on inducing MSMEs in the adoption of digital technologies.[69] Through these partnerships, industries will assist the government in providing appropriate training facilities, including modules, coaches, portable digital devices, and mentors, to provide direct assistance to MSME players. In addition, the national government, national-level PMOs, and regional-level PMOs will focus on organizing and coordinating with regional governments to invite training participants, especially new entrants in the informal sector, and to provide training hubs for MSMEs in each region, where training sessions will be held.

iv. During the training program, each group of MSME players will be accompanied by an industry-employed community facilitator/buddy or and

[68] Regional PMOs for tourism are currently operating in West Sumatra, appointed by the Ministry of State-Owned Enterprises (MoSOEs) in September 2021 to accelerate the recovery of the sector due to COVID-19 pandemic.
[69] MCI, 2020.

MSME local champion to direct private assistance. These representatives are responsible for providing direct supervision and demonstrations to the training participants in conducting tasks up until the onboarding process, or in overcoming specific issues.

v. Training programs will focus on improving the basic to intermediate digital skills of MSME players and business capacities through network expansion. The entry point of MSMEs' digital adoption training can be designed and initiated by digitalizing administrative functions, including office suite, managing products, financial literacy, and so on, and marketing processes to enter both national and international markets.

Example 16: The Republic of Korea's SME Training Consortium[70]

The Ministry of Labor of the Republic of Korea initiated a pilot SME training consortium project in June 2001-December 2002. The project aimed to combat unemployment and improve the productivity of MSME workers in the aftermath of the financial crisis by assisting them to launch and manage in-service training for their employees. The pilot program was implemented by the Korean Chamber of Commerce and Industry (KCCI) in three industrial cities in the Republic of Korea: Busan, Incheon, and Gwangju. Each city has a local chamber of the KCCI that was responsible for organizing a training consortium for 30-50 SMEs. Each consortium is managed by two training managers. The training managers act as training facilitators for the MSMEs. The managers were also responsible for establishing an information network between consortiums, conducting a training-needs survey, planning training activities, collaborating with training institutions, monitoring training activities, and conducting evaluations. The program was successful in increasing SME productivity, preventing unemployment, enhancing competition and cooperation in the training market, and strengthening partnerships between public and private entities. The pilot project involved a total of 732 SME members in three locations and has been multiplied after becoming part of the national priority agenda.

b. ***Provide digital facilities to ensure sustainable usage of the digital economy ecosystem.*** This solution was raised during our dialogues. Ensuring that MSMEs have been digitalized to consistently use digital tools after the completion of training programs is essential. The GoI can initiate the provision of a one-stop

[70] Lee, 2016.

digital kit for MSMEs by collaborating with several industrial partners. The collaboration will aim to create an integrated and compact digital economy ecosystem for MSMEs. Two types of digital kits may be considered:

i. An MSME one-stop portal to increase the competitiveness of MSMEs. An example of an MSMEs portal can be taken from GrabMerchant for the food and beverages sector, as outlined in Example 17. However, the proposed portal will target various types of MSMEs to encourage them to participate in the ecommerce ecosystem and digitalize their business operations. The web portal potentially could be provided by every online marketplace in Indonesia. It will aim to increase the engagement of MSMEs in digital adoption. The web portal can provide MSMEs with access to their respective business reports and data, which are automatically arranged by the online marketplace system. The initiative is expected to ease the managerial process of MSMEs by preparing specific promotional strategies to increase the quantity of product sales.

ii. A digital kit to connect with digital services. This digital kit will provide MSMEs with legal access to obtain both internet packages for connecting with international digital services, and official office suite tools for digitalizing all of their administrative functions, including word processor, spreadsheets, presentations, and online databases. In terms of the price, the digital kit can be provided as a subscription, created using a cost-sharing mechanism between the GoI and relevant industrial parties, including tech companies and ISPs. Lessons can be learned from Example 18 as discussed below.

Example 17: GrabMerchant in Indonesia[71]

GrabMerchant is a one-stop service platform for MSME owners in the food and beverages (F&B) sector, which was introduced in June 2020 to accelerate MSMEs' digital adoption and to increase their competitiveness during the pandemic's outbreak in Indonesia. The platform consists of a desktop application for smartphones and a web portal that assist MSMEs in managing daily business operations and accessing features to support their business, for example online registration, monitoring daily transactions, maintaining connections with supermarkets and minimarkets, ensuring access to raw materials, and advertising products.

[71] Grab, 2020.

Example 18: One-stop MSME digital kit in Malaysia[72]

Celcom Axiata and Microsoft Malaysia provided a one-stop digital kit for Malaysian MSMEs called Celcom Business Suite in October 2021. Celcom Business Suite offers a three-month waiver upon subscription for its productivity pack, Flexy Pack. The pack consists of trusted digital productivity suites, including Microsoft 365 and Microsoft Teams, and postpaid mobile plans from Celcom Mega for MSMEs at an affordable price to support easier collaborations anywhere and anytime. The Government of Malaysia supports the program by providing 30% off when MSME players enroll in a short-term economic recovery plan, Penjana/Pelan Jana Semula Ekonomi Negara. The use of the digital kit is expected to help companies to embrace the digital transformation agenda and to ensure that MSMEs in Malaysia stay competitive and resilient during the COVID-19 outbreak.

Table 7 provides a summary of the key On-the-Job Training actions to be undertaken as part of this strategy, with an indication of the time frame, responsible stakeholders, and potential funding sources where applicable.

Table 7: Key actions to drive On-the-Job Training

Objective: Improve access to On-the-Job Training, in both the formal and informal sectors to support the creation of 50% of the workforce with intermediate and advanced digital skills by 2024, up from ~13%.			
Actions required	**Time frame**	**Responsible stakeholders**	**Potential funding sources**
Develop an employment tax incentive	Short term	MoI, MoM	APBN
Integrate the current OJT agenda with training vendors' input on digital skills training	Short term	MoM, MCI, MoSOEs	APBN, PPP
Develop a large-scale and extensive training agenda for MSMEs	Short term	MCI, MoSMEs, MoSOEs, MoTCE, regional governments, PPP	APBN, APBD, PPP
Provide digital facilities to ensure sustainable use of the digital economy	Medium term	MCI, MoSMEs, MoSOEs, MoTCE, regional governments, PPP	APBN, APBD, PPP

Source: Author

[72] NST Business, 2021.

6. Conclusion

As the fourth-most populous country globally with a large working-age population, Indonesia possesses the tools to significantly harness the benefits of digital technology and achieve its national development goals. Several challenges remain in equipping citizens and workers with digital literacy and skills to accelarete the achievement of the country's goals. Gaps in digital literacy stem from unequal access to internet connectivity infrastructure, the cost of digital devices, and the associated low usage of platforms due to the unresponsive education system. In creating a digitally competent workforce, the country requires strategies to increase broad-based digital skills and to ensure that technological abilities are acquired by workers before entering the job market.

This strategy primer aims to support the GoI in exploring what Indonesia can do to address challenges inhibiting the development of digital literacy and skills. The implementation of 11 multistakeholder workshops involving 77 participants from the government, the private sector, universities, NGOs, and experts led to a consensus on the targets and actions required to address strategic issues regarding three fundamental enablers (digital infrastructure and electricity, investment in education and innovation, and a policy-enabling environment) and three main channels (formal education, vocational training, and on-the-job training) of Indonesia's digital skills development objectives. The workshops examined the associated opportunities for each enabler and channel, identified the key constraints to deliver on these opportunities, and carefully prioritized recommended actions to respond to the constraints.

Digital infrastructure and electricity are important enablers of the effective operation of digital skills development. Indonesia has made progress in broadening internet and electrification connections. However, issues around access to high quality digital infrastructure remain. Electrical distribution is uneven, with high consumption in urban and industrial areas, and low consumption in more rural areas. The country is also characterized by frequent blackouts, inhibiting consistent economic activity. The RPJMN target for internet penetration is 82% and 100% for electrification by 2024, which means that the challenges around accessibility and connectivity that have resulted in low internet usage, which is currently at 54% of the population, must be prioritized to support digital skills acceleration through inclusive access to digital infrastructure in Indonesia, underpinned by electricity.

Investment in education and innovation requires an efficiently coordinated and allocated government budget for education and R&D to advance digital talent. The central and local governments are responsible for the spending of their mandated 20% of the education budget. However, there is a lack of coordination between the responsible parties, and other stakeholders within the subnational governments are rarely involved in the budget planning process. Furthermore, budget allocation for R&D is low and digital innovation is not prioritized as the focus of R&D spending. Ensuring the mandated 20% education budget allocation is spent effectively by local governments and increasing the national government budget allocation for R&D to 1.68% of GDP by 2025 with contributions from the private sector to advance ICT skills development are prerequisities for mobilizing digital transformation.

An enabling policy environment is important to support digital skills development. Although Indonesia has made progress in supporting its digital transformation, there is an absence of a detailed policy framework and government capacity. The 2020-2024 RPJMN has no specific digital skills development targets, leading to a fragmented approach with ministries working in silos. Despite the MCI preparing the Indonesia Digital National Roadmap, no detailed policy framework exists for digital skills development. The government's capacity to manage digital skills development also remains limited partly due to the absence of policies that stress the importance of digital skills for public servants to enable the implementation of a digital government. The GoI has not provided nationally representative indicators for digital skills development to track and match the supply and demand of digital talent, both within and outside the governmental sector. This limits the government's ability to ensure digital skill goals are achieved and prevents the government from being able to identify gaps in the supply and demand of digital skills. There is a need to develop a holistic policy and governance framework to create a conducive environment for digital skills development in Indonesia.

Formal education is the first important channel to help build the country's interrelated digital literacy and skills objectives. The GoI set out a target of 36% of students having PISA reading scores at level 2 proficiency and 50% of the workerforce having intermediate and advanced skills by 2024, up from ~13%. Education policies in Indonesia have been successful in increasing participation at the primary level. However, social inequality, income inequality and geographical challenges, especially outside of Java, prevent people from accessing and continuing on to secondary and tertiary education. At the primary and secondary level, the current 2013 curriculum (K13) does not effectively improve students' basic digital literacy. At the tertiary level, the vocational ICT school and college/university curriculum is not in line with current digital trends and industrial needs. Another remaining challenge is the limited availability of quality professional education programs, which leads to the low quality of teaching staff at the

formal educational level. Improving the quality of primary and secondary formal education through the expansion of education scholarship coverage for low-income families, the development of an occupational-based ICT curriculum, and capacity building for ICT teachers and lecturers is essential for the country to achieve its interrelated digital literacy and skills objectives.

Vocational training is a flexible and inclusive channel to upgrade the digital skills of citizens and the workforce from outside formal education channels. The quality of ICT graduates from BLKs is insufficient for industry due to the lack of relevant ICT courses offered during the programs. Workers also face relatively high costs for participating in private training institutions, thus limiting their opportunities to enhance their digital skills. Improving the quality of public training institutions/Balai Latihan Kerja (BLKs) in ICT and expanding access to private ICT training institutions is required to support the creation of 50% of the workforce with intermediate and advanced digital competencies by 2024, up from ~13%.

On-the-job training (OJT) is an important channel to re-skill and up-skill both formal and non-formal workers focusing on their digital skills. Although new employees in the formal sector may have better opportunities to participate in OJT programs, companies need to allocate more funds if they wish to conduct systematic and sustainable OJT programs. ICT modules are not often included as part of OJT programs. In the informal sector, MSME business owners and their employees struggle to deploy training programs and where deployed, they struggle to maintain the use of digital tools during the post-training period. The recommended actions focus on incentivizing more industries to participate in ICT skills training for their workers and encouraging more digital adoption among MSMEs to achieve the GoI's objectives of 50% of the workforce having intermediate or advanced digital skills by 2024 , increased from 13% in 2020, and 30 million MSMEs going digital by 2024, up from 13.7 million in 2021.

Each recommended action for each enabler and channel has its own guidance in terms of the time-frame, responsible stakeholders, and potential funding sources. The guidance helps the GoI to respond to the constraints identified in digital skills development in the order in which the actions should be executed, and by which stakeholders, and provides a sense of what resources need to be invested.

7. Appendix

A1: Stakeholders who participated in the policy dialogue discussions

No	Institution	Number of Participant
1	National Development Planning Agency (Bappenas)	14
2	Ministry of Communication and Informatics (Kominfo)	3
3	Ministry of Education, Culture, Research, and Technology (Kemendikbud)	8
4	Ministry of Industry (Kemenperin)	5
5	Ministry of Manpower (Kemenaker)	3
6	Ministry of Villages, Transmigration, and Disadvantage Regions (Kemendes)	7
7	Ministry of Trade (Kemendag)	2
8	Coordinating Ministry for Economic Affairs (Kemenkoekon)	3
9	Ministry of Energy and Mineral Resources (KemenESDM)	2
10	Ministry of Public Works and Public Housing (KemenPUPR)	2
11	National Research and Innovation Agency (BRIN)	1
12	Professional Associations	7
13	NGO/Universities	8
14	Private sector	4
15	Training institutions	8
	Total	**77**

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