

DIGITAL GREEN SKILLS IN INDONESIA

FOR SUSTAINABLE TRANSITION



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➔ INTRODUCTION

Indonesia requires a sustainable transition to efficiently manage its natural and human resources. Technological innovation and digitalization can help the sustainable transition process run faster. The Indonesian government has made clear their commitment on sustainable transition by being a signatory to the Paris Agreement and Sustainable Development Goals (SDGs); both known as an international treaty to transition into a sustainable industry. On the national scope, the government has also made clear their intent to force industry to enact more social and environmental action by signing the Law Number 40 of 2007 concerning Limited Liability Companies and Government Regulation number 5 of 2021 on the Implementation of Risk-Based Business Licensing. However, to implement sustainable transition strategies, this process calls for personnels with particular skills and jobs. Therefore, for contemporary Indonesian workers and employers aiming to initiate a sustainable transformation, digital green skills are crucial.

It is important to recognize, however, that the narrative surrounding digital green talents was created by modern states, potentially leading to new forms of dependence. There may be political pressure on Indonesia and other developing nations, which remain dependent on modern nations, to accept new global workplace norms without fully considering the local context.

Furthermore, digital transformation is often seen as a catalyst for efficient work, and technology is viewed as an essential tool for carrying out tasks for achieving a sustainable transition¹. However, the digitalization of work does not always have positive environmental outcomes, especially when the technology relies on large and unsustainable energy resources. For example, operating data centers and running an AI system consume large amounts of unrenewable energy sources². This article, therefore, criticizes the concept of 'green' in green jobs as it may carry misleading implications and create fallacies that contribute to greenwashing practices, ultimately pushing society further away from a truly green economy.

Based on this background, this study proposes two critical questions as follows: (1) How to mainstream digital green skill in Indonesia? (2) What are the risks of digital green skill in Indonesia?

To answer these research questions, this study will map out definitions, conditions, and challenges to the implementation of digital green skills in Indonesia.

FINDING 1

→ DEFINITION OF DIGITAL GREEN SKILLS, GREEN SKILLS AND GREEN JOBS

Green skills refer to the expertise needed by the workforce across all sectors and levels to adapt products, services, and processes in response to climate change, environmental requirements, and regulations, thereby fostering a more sustainable economy³. As an example, jobs that require green skills include making carbon footprint reports and strategizing a company's asset and energy transition to reduce waste and reliance on non-renewable energy. These skills have become increasingly urgent in the workplace due to global competition for a green economy since sustainable transitions enable established socio-technical systems to evolve into more environmentally friendly forms of production and consumption⁴. However, in a highly digitized workforce, there are digital capabilities that serve as important add-ons to green skills. This is called digital green skills.

Digital green skills refer to specialized skill sets needed to develop and implement net-zero technologies essential for achieving climate neutrality⁵. Jobs that require these skills include data scientists preparing carbon footprint reports, technicians and developers of smart homes, and environmental protection compliance officers, and many others.

According to a study conducted by ATHENA Research Center, PricewaterhouseCoopers (PwC) and Huawei, the modern industry demands a wide range of talents and green professions, as illustrated in Table 1. A solid educational background centered on science, technology, engineering and mathematics (STEM) subjects, highlighted in the column on foundational skills, is crucial for workers to perform tasks like data collection, processing, and visualization as well as creating computer programs for green and digital jobs.

Table 1. Mapping green skills, digital skills, green digital skills and green digital jobs

Foundational Skill		Green Digital Skill	Green and Digital Job
Green Skill	Digital Skill		
Environmental Sciences	Browsing, searching and filtering digital data	Database and advising on environmental issues	Green database and network design
Natural Environments And Wildlife	Programming computer systems	Complying with environmental protection laws and standards	Environmental assessor; Sustainability Manager
EcoDesign	Designing electronic systems or equipment	Maintaining electrical, electronic and using precision equipment	Energy systems engineer; Smart home engineer



Sumber: Koundouri, P. et.al (2023)

The green economy has become a significant factor in modern job preferences. A study by Accenture found that 77% of young people in Asia-Pacific seek employment in environmentally friendly sectors⁶. LinkedIn research shows that the number of global workers with green skills in 2023 rose 15%, higher than the previous year⁷. The majority of workers entering green jobs have a STEM educational background, as companies focus on developing and implementing technology-based solutions to meet their sustainability goals.



For everyday use and general digital citizens, digital green skills involve raising awareness that all digital activities have a carbon footprint. Simple actions, such as reducing the sending of emails with excessive visuals like videos or GIFs, can have significant environmental impact, as noted in a study by the BBC.⁸ Additionally, creating lighter websites can reduce energy consumption, as they require less energy to access. Therefore, digital green skills are crucial for web developers and designers in creating more environmentally friendly web solutions.

Based on the findings above, the criticism of green jobs is that the focus often centers solely on job creation, whereas behavioural changes or increased awareness of environmental issues are more significant. This is particularly important for achieving a sustainable transition. It is crucial to emphasize the creation of a productive green economy that attracts talent and fosters environmentally conscious industries. We shall refer to this concept as 'green productivity', which means that when individuals are fully aware of environmental challenges both and practically, their work habits and lifestyles will also reflect this awareness.

FINDING 2

→ DIGITAL GREEN SKILL URGENCY IN INDONESIA

Climate change and sustainable transition are often the main arguments for green skills adoption. This is because the Paris Agreement that has been agreed upon by all 195 country signatories includes an article about Action for Climate Empowerment (ACE) and links green skills as important tools to change the systems, attitudes and behaviors needed to transition to a just, low-emission and climate-resilient world.⁹

The Paris Agreement is an international treaty in which signatories committed in limiting the rise in global temperature through intervention in the industrial sector.¹⁰ Several key treaties support this agreement, including the European Union's policy targeting a 55% reduction in greenhouse gas (GHG) emissions by 2030¹¹ and the United Nations' 17 Sustainable Development Goals (SDGs)¹² outlined in the 2030 Agenda for Sustainable Development, which aims to manage resources efficiently and equitably.

As a country that has ratified the Paris Agreement and SDG commitments, and given the global impact of European countries on international supply and demand, Indonesia must take steps to ensure its natural and human resources are managed sustainably. Digitalization could help pave the way to ensure a sustainable transition and digital green skills are necessary to support the process by equipping workers with the necessary competence.

As the world transitions towards a more just and green economy, the nature of future employment will change. According to an OECD report, future employment trends will focus on transitioning traditional jobs to digital roles and reducing carbon emissions in company operations.¹³ A UN report also highlights that green skills can speed up a country's achievement of the SDGs, as they equip individuals with modern capacities that address the challenges of climate change.¹⁴

The Indonesian government's commitment to reducing the impact of climate change and improving community welfare has been reflected in various national agencies and strategies. One of the key government bodies carrying out sustainable transition strategies is the Ministry of National Development Planning/Bappenas. In collaboration with Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH, Bappenas has mapped out essential green talents that are pivotal in carrying out Indonesia's green economic transformation as outlined in Table 2.¹⁵

Table 2. National Occupation Maps Green Jobs in the Indonesian National Qualifications Framework

Identified Occupation Details	Number of Occupations	Example of Occupation
Cross-sector	73	Green productivity specialist
Agriculture	11	Forest and Conservation Technician
Manufacturing	15	Emissions Carbon Professional,Lean Industry Consultant
Construction	12	Green Buliding Specialist
Renewable energy	71	Energy Analyst; Solar Panel Installer
Tourism services	9	Environmental Architecture
Total Okupasi	191	

Sumber: Koundouri, P. et.al (2023) yang sudah diolah peneliti.

Based on the key functional areas identified in Table 2, there are at least 191 green-oriented occupancies spread across five economic areas: renewable energy, agriculture, manufacturing, construction and tourism services.¹⁶ To meet the demand of these sectors, it is projected that 4.4 million people with strong science and computing skills will be required by 2030.

In terms of regulations for the business sector, the Indonesian government has prioritized the green economy at the national level. A significant move was the enactment of Law Number 40 of 2007 concerning Limited Liability Companies which mandates companies to carry out Social and Environmental Responsibility in their operations.¹⁷ This law compels companies to contribute to sustainable economic growth by improving the environment and the quality of life, benefitting not just the company, but also surrounding communities. Conducting environmental and operations assessment with green skills capacity can help companies identify challenges and success stories that align with this mandate.

In addition to business regulations, Government Regulation number 5 of 2021 on the Implementation of Risk-Based Business Licensing outlines important considerations for business licensing.¹⁸ Article 9 paragraph (1) mandates that businesses conduct evaluations based on the degree of risk involved in their operations, with a focus on environmental factors, health and safety issues, resource management and other related aspects. To carry out the assessments and analyses, workers must possess the skills necessary to perform the tasks outlined in Tables 1 and 2.



FINDING 3



CHALLENGES FOR INDONESIA TO DEVELOP DIGITAL GREEN SKILL

LinkedIn research indicates that most of the skills workers need to transition into sustainable employment will be required in sectors such as science, utilities, mining, mathematics and the construction sector.¹⁹ These jobs demand a strong STEM educational background, as companies increasingly prioritize technology-based innovation and engineering techniques. However, referring to Bappenas data, only 18.47% of Indonesian students graduate from STEM fields, a number significantly lower than Malaysia at 37.19%, Singapore at 34.30%, and India at 31.41%.²⁰

The shortage of STEM-educated workers in Indonesia could lead to an increased reliance on foreign STEM talents to work in digital green skills in Indonesia. This is particularly important as digital green skills require a complex ecosystem consisting of research, manufacturing, infrastructure, and maintenance. For Global South countries like Indonesia, which are still in the development level and may not be capable of developing such an ecosystem, importing technology and workers are strategic approach for leapfrogging toward digital transformation and economic acceleration.²¹

However, relying on importing technology and digital talent may lead to dependence on foreign suppliers for equipment, labor and funding. This condition can potentially trigger a classic phenomenon that is often seen in resource-rich developing countries that fail to maximize their economic potential due to mismanagement, known as the 'resource curse'.

One characteristic of the resource curse is when reliance on foreign technology and funding leads to monopolistic practices, extortion and reduction of power in local autonomy.²² In the context of digital green skills, it is important to critically examine that much of the discourse on green expertise, the green economy, and climate change targets originate from Western institutions like the UN, the European Union and the OECD. As a result, the solutions offered often revolve around the use of the latest technologies, research and business models developed by these institutions.

FINDING 4

➔ RISK OF GREENWASHING

Beyond critiquing green skills and digital green skills as being influenced by the interests of western institutions, it is also critical to acknowledge that the term 'green' can sometimes be misused, leading to what is known as greenwashing. Greenwashing involves actions that give the impression of being environmentally friendly, while in practice, they are against sustainable principles.²³

In the context of digital green skills, for example, while digitalization and technology can enhance efficiency through integrated data management, improved communication through the internet and connectivity facilities, and carbon tracking systems, these innovations require infrastructure and facilities that consume non-renewable energy. This condition would impede the goal of sustainable transitions.

Numerous studies indicate that modern technology consumes more significant resources than ever before. For example, a standard-sized email produces 5-10 grams of carbon dioxide emissions, and energy consumption by data centers in the European Union is projected to reach up to 3.21% of total electricity demand by 2030.²⁴ Therefore, if digital green skills lead to an increase in information circulation through emails, cloud data, and infrastructure development on a larger scale, the resultant environmental impact and pollution could be bigger.

CONCLUSION

This research has explored the definition, urgency and challenges of the digital green skills and identified numerous efforts to mainstream these skills in Indonesia. Key agreements related to climate change and sustainable transition targets provide a foundation for the Indonesian government to support its expertise in green jobs, with digital green skills being essential. The Indonesian government has issued regulations and mapped out occupations that require digital green skills, helping to identify strategic sectors and future job occupations.

However, the development of digital green skills and green jobs requires highly educated talent with a STEM background, advanced computing capacities, and proficiency in cutting-edge digital technologies like data processing and complex engineering. Indonesia currently struggles to meet these needs, which may lead to reliance on imported technology and human resources. This condition may undermine both human resource development and the wider Indonesian economy.

Sustainable transition jobs and green jobs are contingent upon workers possessing both environmental awareness and the capability to operate advanced technology and innovation. However, there is a risk of implementation errors if the facilities and infrastructure supporting digital green skills do not adhere to sustainable principles. This could lead to greenwashing, and undermine public trust in the green discourse.

Contextualizing sustainability transitions is also crucial, considering each country and government approaches varied. The complexity and multidimensional approach, which require reiterative processes, should not be reduced to merely 'greening' all kinds of work. It is critical to evaluate targets that focus solely on the quantitative creation of green jobs, rather than on the meaningful development of skills related to environmental issues.

➔ REFERENCES

- 1 Rosário, A. T., Dias, J. C. 2022. Sustainability and the Digital Transition: A Literature Review. *Sustainability* 14, no. 7: 4072. <https://doi.org/10.3390/su14074072>
- 2 Calvert, B. 2024. AI already uses as much energy as a small country. It's only the beginning. *Vox*. <https://www.vox.com/climate/2024/3/28/24111721/climate-ai-tech-energy-demand-rising>
- 3 OECD/Cedefop., 2014, *Greener Skills and Jobs*, OECD Green Growth Studies, OECD Publishing, Paris, <https://doi.org/10.1787/9789264208704-en>.
- 4 Markard, J., Raven, R., Truffer, B., 2012. Sustainability transitions: An emerging field of research and its prospects. *Research Policy* 41, 955–967. doi:10.1016/j.respol.2012.02.013
- 5 Koundouri, P., Landis, C., Toli, E., Papanikolaou, K., Slamari, M., Epicoco, G., Hui C., Arnold, R., Moccia, S., 2023. *Twin Skills for the Twin Transition: Defining Green & Digital Skills and Jobs*. December 2023, AE4RIA, ATHENA Research Centre, Sustainable Development Unit.
- 6 Law, K., 2023. Where are the green jobs in Singapore?. *The Straits Times*. https://www.ntu.edu.sg/docs/default-source/corporate-ntu/hub-news/st_230918_greenjobs.pdf?sfvrsn=53dc5d18_5
- 7 LinkedIn Economic Graph. (2024). *Global Green Skills Report 2023*. LinkedIn. <https://economicgraph.linkedin.com/content/dam/me/economicgraph/en-us/global-green-skills-report/green-skills-report-2023.pdf>
- 8 Griffiths, S. 2020. Why your internet habits are not as clean as you think. *BBC*. <https://www.bbc.com/future/article/20200305-why-your-internet-habits-are-not-as-clean-as-you-think> (Accessed 3 September 2024).
- 9 UNFCCC. 2023. Why Area Green Skills Important for Youth. <https://unfccc.int/news/why-are-green-skills-important-for-youth> (Accessed 1 September 2024)
- 10 Op. Cit United Nations Climate Change.
- 11 Op. Cit. European Council.
- 12 UN. *The Sustainable Development Agenda*. UN. <https://www.un.org/sustainabledevelopment/development-agenda-retired/> (Accessed 3 September 2024)
- 13 OECD., 2023, *Assessing and Anticipating Skills for the Green Transition: Unlocking Talent for a Sustainable Future, Getting Skills Right*, OECD Publishing, Paris, <https://doi.org/10.1787/28fa0bb5-en>. (Accessed 1 September 2024)

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- 14 United Nations., 2023. ISSUE BRIEF for the Government of Indonesia Green skills for youth: Shaping a greener future for youth in Indonesia. UN. <https://indonesia.un.org/en/246222-issue-brief-government-indonesia-green-skills-youth-shaping-greener-future-youth-indonesia> (Accessed 23 August 2024)
 - 15 Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH, Kementerian PPN/Bappenas., 2023. Peta Okupasi Nasional Green Jobs dalam Kerangka Kualifikasi Nasional Indonesia. Kementerian PPN/Bappenas. <https://petaokupasi.bappenas.go.id/download/peta-okupasi-nasional-green-jobs-dalam-kerangka-kualifikasi-nasional-indonesia-kkni/>
 - 16 Op.cit. Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH, Kementerian PPN/Bappenas.
 - 17 Republik Indonesia. 2007. Undang-undang (UU) Nomor 40 Tahun 2007 tentang Perseroan Terbatas. Database Peraturan BPK. <https://peraturan.bpk.go.id/Details/39965>
 - 18 Republik Indonesia. (2021). Peraturan Pemerintah (PP) Nomor 5 Tahun 2021 tentang Penyelenggaraan Perizinan Berusaha Berbasis Risiko. Database Peraturan BPK. <https://peraturan.bpk.go.id/Details/161835/pp-no-5-tahun-2021>
 - 19 Op.Cit. LinkedIn
 - 20 Rosa, N., (2023). Bappenas: Jumlah Lulusan STEM Indonesia Jauh Lebih Rendah dibanding Negara Lain. Detik. <https://www.detik.com/edu/perguruan-tinggi/d-6844093/bappenas-jumlah-lulusan-stem-indonesia-jauh-lebih-rendah-dibanding-negara-lain>
 - 21 Ciuriak, D., Ptashkina, M, A Global South Strategy to Leverage the Digital Transformation for Development (June 17, 2019). World Trade Organization, Enhanced Integrated Framework (EIF) Aid for Trade Series (2019), Available at SSRN: <https://ssrn.com/abstract=3405330>
 - 22 Leonard, A., Ahsan, A., ... Hirmer, S., 2022. The resource curse in renewable energy: A framework for risk assessment. Energy Strategy Reviews 41. doi:10.1016/j.esr.2022.100841
 - 23 Kozar, Ł.J. and Bolimowski, S., 2024. EXPOSING GREENWASHING: A CATALYST FOR GREEN ECONOMY DEVELOPMENT. Scientific Papers of Silesian University of Technology. Organization & Management/Zeszyty Naukowe Politechniki Śląskiej. Seria Organizacji i Zarządzanie, (197).
 - 24 Kronenberger, G., Schlemmer, M., Melches, R. 2022. Considering the carbon impact of Big Data. Strategy. <https://www.strategyand.pwc.com/de/en/industries/telecommunication-media-and-technology/considering-carbon-impact-big-data.html> (Accessed 3 September 2024).



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