

Global Cooperation and Gender Equity in the Green Economy: Challenges to Indonesian Women's Participation in Green Jobs

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Abstract

This study aims to examine the role of international cooperation in improving gender equality in the green economy, with an emphasis on the barriers faced by Indonesian women in engaging in green employment. This study emphasizes the importance of international cooperation and domestic policies in building a green economy that is equitable and inclusive for all genders. Although the transition to a green economy creates new job opportunities, women's participation in Indonesia remains low because of social, cultural, and structural barriers. Women are under-represented in the energy and STEM fields, face discrimination in recruitment processes, and have limited access to sustainable training. Reports from the IMF (2024) and UN Women (2024) emphasize that increasing women's participation can accelerate sustainable innovation and equitable climate policies. This study employs a literature-based qualitative method to examine Indonesian women's involvement in green jobs. Information was gathered from international and national journal articles, reports from global organizations such as UN Women, the World Bank, and the ILO, and government policy documents related to the green economy and gender issues in Indonesia. The analysis employed a thematic approach, highlighting structural barriers such as limited access to training, wage inequality, and the underrepresentation of women, along with social barriers, including gender stereotypes and established norms. Furthermore, this study highlights the potential of international partnership initiatives to increase women's participation in green jobs. The results suggest that while many challenges still limit engagement, global engagement and inclusive programs offer significant potential to strengthen gender equality and promote a just and equitable green economy shift in Indonesia.

Keywords: *Global Cooperation, Gender Equity, Green Jobs, Indonesian Women*

1. Introduction

The global transition toward a green economy has become an increasingly urgent agenda, particularly in response to the escalating impacts of climate change and widening social inequality generated by conventional development models. A green economy emphasizes low-carbon development, efficient resource use, and social inclusion as the core principles for achieving sustainable growth (UNEP, 2023). The global shift toward this model relies heavily on international collaboration, especially in areas such as financing, technology transfer, and workforce capacity building through training and certification programs.

However, the implementation of a green economy reveals a persistent gender gap, particularly in women's access to green jobs. Sectors such as renewable energy, environmental technology, and green infrastructure remain male-dominated, indicating structural, cultural, and social barriers that hinder women's full participation (International Labour Organization [ILO], 2022). In Indonesia, a developing country committed to achieving net-zero emissions by 2060, the potential for expanding green jobs is significant. Key sectors, such as renewable energy, waste management, sustainable agriculture, and environmental innovation services, offer opportunities for inclusive workforce development. Despite this potential, women's participation in green jobs is relatively low. Recent data show that only approximately 19% of women work in green energy technology-related sectors (Ministry of Manpower, 2023).

Several factors contribute to this condition, including the STEM education gap, cultural bias surrounding gender roles, limited access to training programs, and a lack of effective affirmative-action policies. At the international level, collaborative frameworks such as the G20, the Paris Agreement, and initiatives such as the Green Climate Fund provide opportunities for Indonesia to expand women's access to green skills development and international professional networks. However, these initiatives

have yet to effectively reach vulnerable groups and rural women, whose limited access to education, technology and financial support places them at an even greater disadvantage.

This gap highlights the need for more targeted, inclusive, and gender-responsive policy designs in global cooperation mechanisms. Given these challenges, this study aims to identify the structural barriers and emerging opportunities for Indonesian women in accessing green jobs while analyzing the role of global cooperation in promoting gender equality within the green economy. By examining policy frameworks, global best practices, and national-level implementation, this study contributes to the academic discourse on sustainable development, employment policies, and gender studies. The findings are expected to provide insights into how international collaboration can better support Indonesia's transition by ensuring that women are not left behind in shifting toward a green and inclusive future.

2. Literature Review

The shift to a green economy is a crucial global goal of the 21st century, linking the challenges of climate change, shifting labor markets, and social justice. Women's roles in this change are crucial and will determine whether green economy plans are inclusive or perpetuate long-standing inequalities. Based on the papers you provided, it is clear that Indonesian women face challenges in securing green jobs, and these challenges are linked to global developments, local social situations, the structure of the country's economy, and power relations in natural resource management.

Each paper provides a crucial piece of the larger story, meaning that putting them all together helps us fully understand how global collaboration and domestic change need to be guided so that Indonesian women are not left behind in our efforts to become green. Xin Yu Peng, Yu Hao Fu, and Xing Yun Zou's research highlights the crucial connection between gender equality and environmentally friendly progress. Nations committed to improving female involvement in education, leadership roles, and technological access commonly implement more robust environmental regulations. The research team determined that the beneficial effects of women include prioritizing sustainable strategies, emphasizing societal consequences, and using resources responsibly (Peng, Fu, & Zou, 2024).

The study also points out that traditional cultural standards continue to pose considerable obstacles across the Asia-Pacific region, including Indonesia. Women are often limited to unpaid work at home and in the informal sector, whereas highly valued environmentally focused employment necessitates technical expertise and technology accessibility, where men still comprise the majority. Consequently, although social conventions that are slow to change restrict women's ability to promote environmentally sound progress, their capacity to do so is considerable. In Indonesia, Muthmaina's study on women's empowerment reveals a more complex inequality.

Although the national women's empowerment index shows overall advancement, considerable regional differences continue to exist, which immediately affect women's capacity to participate in environmentally friendly industries (Muthamania, 2024). Javanese regions show strong empowerment scores, attributable to their developed infrastructure and greater access to education. Conversely, regions such as Papua, Nusa Tenggara, and Maluku have lower empowerment scores, which deprives women in these places of the required social and economic means to seek training in renewable energy, environmental technologies, or other environmentally conscious jobs. This geographical divide clarifies why most Indonesian women working in the green sector are primarily found in metropolitan areas with appropriate infrastructural support.

A study conducted by Rahmania, Milanie, Hidat, and Qutrunada bolsters this concept by demonstrating that environmental sustainability benefits from gender equality (Rahmania, Kertamuda, Wulandari, & Marfu, 2025). Sustainable land utilization methods, encompassing water regulation, waste minimization, and resource protection, improve when women are educated and have stronger social standing. Nevertheless, the study also found that the full potential of this connection has not been realized by government policies due to inconsistencies between policy execution and local societal realities. Significant barriers include established cultural practices, ineffective local organizations, and

limited presence of women in governmental bodies. Consequently, national initiatives, such as those promoting a green economy, do not fully incorporate women's environmental development efforts.

Documents focusing on how women handle forests in Indonesia highlight the ecological role that women play. These documents show that women have a deep understanding of the environment, gained from knowledge passed down through their families. They actively gather forest resources other than timber, care for local food supplies, and manage the land, all of which help reduce environmental damage. Although they contribute significantly, the forestry industry's official systems are mostly run by men, leaving little room for women's involvement.

In addition, women usually do not have land rights or a say in the decisions made by village organizations. As the green economy emphasizes proof of sustainability, legal compliance, and available funding, women who are not officially recognized are naturally sidelined. This implies that the environmental efforts of women align with the values of a green economy, but they do not have the official relationships needed to turn these efforts into opportunities for financial gain. In a publication from the International Monetary Fund, Abril writes that a move towards environmentally friendly economies on a global scale will lead to the creation of numerous employment opportunities across the planet (Abril, 2020).

These new positions span different fields, such as solar and wind power generation, proper disposal of refuse, eco-friendly transit options, building infrastructure that produces minimal pollution, and various ecological support roles. Nevertheless, the research also indicates that women hold only a small number of these jobs because they generally have less opportunity to learn about science, technology, engineering, and mathematics. This is where worldwide collaboration is crucial. Ruiz Abril stresses the importance of sharing technological advancements, providing educational grants for international study, and funding projects in a way that includes women, all to help less developed nations train women for employment in the green sector.

This implies that nations such as Indonesia may find it difficult to quickly improve women's skills if there is no global assistance, because green technology is still primarily found in more advanced nations. After putting all of this research together, it is obvious that Indonesian women encounter numerous different problems when trying to participate in environmentally friendly economic activities. One issue is the underlying system that makes it harder for women to receive the same education as men, gives them an unfair share of resources, and prevents them from using new technologies. Another issue arises from the long-standing cultural expectations that keep women out of jobs that require technical skills. The lack of influence women have when important choices are being made demonstrates yet another kind of issue. If significant changes are not made, Indonesian women will not be able to take advantage of the opportunities presented by the environmentally friendly economy, which ideally would help to make things fairer for them.

Therefore, changes within the country must occur simultaneously with collaboration among countries. The government should provide more opportunities for women to learn technical skills, implement gender-related policies, acknowledge the ways in which women help protect the environment, and ensure that everyone has an equal opportunity to obtain funding and use technology. If these actions are not taken, Indonesia's efforts to become more environmentally friendly will only improve things from a technical perspective and will not address the need for fairness in society, which should be the most important part of this change.

3. Methodology

This study employed a qualitative approach using a systematic literature review method. This method allows for comprehensive mapping of global issues related to policy, gender equality, and the dynamics of green economy implementation. Data were collected from scientific articles, international institutional reports such as UN Women, ILO, UNEP, and the World Bank, and Indonesian government policy documents, including Presidential Regulation No. 98/2021 on the Economic Value of Carbon. Primary sources were accessed through Scopus, Google Scholar, ScienceDirect, and official

institutional websites of the authors. The inclusion criteria were as follows: (1) publications from 2019 to 2024, (2) relevance to the green economy, green jobs, and gender equality, and (3) full-access availability. The exclusion criteria included off-topic publications and those lacking academic credibility.

Data were analyzed using thematic analysis following Braun and Clarke's (2021) model, with themes including forms of global cooperation, women's participation barriers, national policies, and competency development opportunities. Data validity was ensured through source triangulation by comparing academic journals, government policies and official reports from international institutions. An additional analytical layer involved reviewing best practices from countries such as Germany, Canada, and South Korea, which have successfully increased women's participation in the green sector through STEM-based training policies, employer incentives, and guaranteed access to green technologies. This comparison helps contextualize Indonesia's position in the global landscape and identify more effective pathways for international collaboration.

4. Result And Discussion

4.1 The Dynamics of the Global Green Economy and Its Linkages to Gender Equality

Over the last 20 years, the growth of the green economy has shown a growing and steady move away from using resources for development and towards making sustainability the main way to make economic choices. This change has been greatly affected by global promises to fight climate change. The Paris Agreement sets up a legal system that pushes each nation to come up with its own plans that include cutting emissions, adapting to changes, and finding ways to pay for climate-friendly projects that will last. This worldwide promise encourages investments in non-polluting energy, low-carbon transportation, sustainable forestry, and new technologies that aim to use resources wisely.

Simultaneously, the Sustainable Development Agenda offers a wider path for growth. Sustainable Development Goal eight highlights the importance of everyone being part of economic growth and creating good jobs for all kinds of people in society. Sustainable Development Goal five also says that we must consistently work towards equality between all genders. Therefore, the global green economy makes social and economic factors key parts of caring for the environment, instead of treating them as separate problems. This international setup then tells countries to create plans for going green that not only cut emissions but also focus on how it affects society and the quality of jobs for groups that have been pushed to the side in the past (United Nations Framework Convention on Climate Change, 2015). Worldwide collaboration concerning environmentally friendly economic practices is based on four integrated supporting structures. The initial support comprises global financial support, empowering nations with modest to average financial resources to secure funds for initiatives promoting clean energy, strengthening the ability to withstand climate effects, and encouraging economic strategies with reduced carbon emissions.

Mechanisms such as financial aid from multiple countries, environmentally purposed bonds, and monetary arrangements for climate-related concerns, handled by international groups, offer the economic foundation needed for developing countries to meet internationally accepted requirements. The next support structure involves the exchange of technological advancements, which makes it easier to incorporate new concepts in clean energy and methods for long-lasting production. The effectiveness of technology transfer is highly dependent on how well a receiving nation can adapt innovative technologies to match the particular traits of its society and economy. The third support involves the creation of benchmarks by worldwide entities to guarantee environmentally focused investments that follow universally acknowledged standards for high quality, openness, and ecological sustainability. These benchmarks feature explanations of environmentally sustainable employment roles, standards for fulfilling emission regulations, and advice for creating projects that minimize carbon output.

The fourth supporting aspect is boosting capabilities, focusing on strengthening the expertise of organizations, governmental workers, and the labor pool, ensuring that nations possess the technical and organizational skills necessary to effectively bring about changes to green practices. Each of these supports shows that environmentally conscious economy advances due to a multifaceted framework of

worldwide teamwork, demanding a balance of objectives among industrialized and emerging nations (United Nations Conference on Trade and Development, 2023). However, numerous investigations indicate that the idea of a green economy as a process affecting all genders equally should not be taken for granted.

Many policies intended to promote a shift towards environmentally friendly practices are created while considering existing disparities in the job market. Because of how labor is divided among sectors, many women end up working in jobs such as small farms, informal jobs, and caring for others. Simultaneously, most available jobs in the green sector are found in fields such as technology, construction, and energy, which have traditionally been dominated by men. Additionally, many women experience obstacles when trying to obtain formal loans, access professional networks, and receive vocational training, all of which are necessary for obtaining employment in technology-related green industries.

Research examining gender concerns in climate policy demonstrates that global commitments that consider gender are frequently not properly reflected in national regulations. In other words, international standards for gender equality do not immediately translate into practical policies that consider the structural obstacles women encounter at the community level. The green economy runs the risk of preserving or even worsening already existing disparities if an analytical approach that specifically addresses the significance of gender in financing, technological innovation, and energy transition initiatives is absent (Sauer, 2021).

This global perspective lays the essential groundwork for grasping the factors that influence the prospects and obstacles confronting Indonesian women. The growth of industries focused on renewable energy, environmentally friendly farming methods, and ecological stewardship has generated new avenues for women to find work in environmentally conscious professions. Furthermore, inventive funding strategies, such as green bonds in Indonesia, are initiating possibilities for the advancement of women-run small and micro businesses, on the condition that financial regulations incorporate fair and accessible systems. Nevertheless, numerous investigations have demonstrated that women continue to encounter obstacles when trying to obtain specialized instruction, secure funding, and discover avenues for involvement in sanctioned work within the environmentally friendly energy domain.

Additional hindrances emerge from the imbalanced division of household duties and established societal expectations that curtail women's freedom of movement and authority in making choices that impact the economic condition of their families. This disparity puts Indonesian women at a disadvantage in leveraging the prospects presented by the shift toward a green economy. Consequently, worldwide partnerships pertinent to Indonesia must incorporate gender-specific metrics, prerequisites for data segmented by sex, and reporting systems that guarantee impartial access to the advantages of environmentally conscious economies.

Indonesia's plan for transitioning to a greener economy will achieve greater efficacy if it integrates an international structure alongside domestic strategies that eliminate hindrances to entry, enhance women's capabilities, and foster their energetic involvement in the burgeoning green sector (Anastasya 2023). These interactions reveal that a worldwide environmentally friendly economic system is not simply a technological goal; instead, it is a societal objective shaped by political powers, worldwide standards, and existing unequal systems within communities. Thus, grasping the connection involving international regulations, nationwide administration, and the lived experiences of Indonesian women is very important to ensure that the shift towards an eco-friendly economic system is both ecologically lasting and equitable for all members of society.

4.2 Conditions of Indonesian Women's Participation in Green Jobs

Women's participation in green jobs in Indonesia shows an uneven pattern between high-value technical and non-technical or community-based jobs. Global findings from IRENA indicate that women comprise only about one-third of the renewable energy workforce, with a much lower proportion in STEM and technical positions, particularly in sectors like wind, where women account for only around

20% of workers. This pattern is relevant to the Indonesian context, where women's access to technical jobs in renewable energy remains limited due to a lack of field experience, hiring bias, and limited formal training opportunities in this field. Instead, women are more likely to work in administrative roles, public education, community engagement, and downstream activities in the value chain.

The ILO indicates that women are quite dominant in the circular economy sector, but primarily in low-value-added activities such as waste sorting or recycling, while access to technical positions in green industries remains limited. This situation is also evident in Indonesia, where informal and community employment are the primary avenues for women's participation, while their involvement in more structured and environmentally friendly industrial units remains low. In emerging sectors such as green mobility and low-carbon manufacturing, women typically fill support roles, such as administration, project coordination, and sustainability reporting. The underrepresentation of women in the core value chain prevents them from gaining the technical experience necessary for career progression.

This aligns with IRENA's findings that gender inequality in technical positions hinders women's opportunities to enter decision-making roles in the renewable energy sector. This situation reflects both quantitative and qualitative inequalities: the number of women working in the green sector is still low, and even when they are involved, they tend to be concentrated in nontechnical positions. With the acceleration of the energy transition and circular economy in Indonesia, this inequality has the potential to widen if women do not have adequate access to technical training, certification, and formal employment opportunities in the green industry (IRENA 2021).

4.3 Major Barriers for Indonesian Women in Green Jobs

The difficulties Indonesian women encounter when trying to get environmentally friendly jobs are influenced by the interplay of economic systems, cultural standards, and the organizations responsible for creating and implementing policies for a green transition. These three aspects are inextricably linked, as they all work together at the same time to decide who gets to participate in the green economy and who is kept out of the new opportunities that emerge. In Indonesia, structural, sociocultural, and institutional obstacles are closely connected, making women especially susceptible and likely to be overlooked as the economy shifts to one with lower carbon emissions.

The following explanation will show how these three types of obstacles combine to form significant and tangible barriers for Indonesian women. Structural challenges are caused by the green industry's workforce needs, which depend significantly on specialized skills and academic training in STEM subjects. A considerable amount of specialized knowledge is necessary for green jobs, especially in renewable energy, low-carbon production, and ecological control. This creates a hurdle, as Indonesian women continue to be insufficiently represented in scientific and technical education. The percentage of women involved in scientific and engineering fields is less than that of men, while the majority of green jobs that offer potential economic advancement and consistent income are focused on these areas. Studies have consistently demonstrated that gender prejudice in education, preconceptions about scientific ability, and a shortage of female role models in engineering and energy are the root causes of low female participation in science and engineering fields (Utami, 2020).

Because of this disparity, women tend to be more prevalent in administrative or social green jobs, which prevents them from fully benefiting from the clean energy industry's increasing growth. Furthermore, a gender-aware strategy has not been consistently incorporated into Indonesia's vocational education system. Many technical training facilities lack training materials, women-friendly amenities, and conducive learning environments for women. The lack of female teachers, safety concerns during fieldwork, and inaccessible bathroom facilities are frequently the reasons why women choose not to pursue green technical training, despite the industry's substantial career prospects. Structural barriers are evident in the inconsistent availability of green sector training opportunities.

Courses for solar panel technicians, digital skills improvement, and clean energy equipment maintenance tend to be clustered in cities or areas with thriving economies. This distribution creates challenges for women in rural or distant locations, who struggle to participate in training programs

because of restricted movement, travel expenses, and ongoing family responsibilities. The fact that green jobs, especially those in renewable energy, are typically found in remote areas far from where people live, intensifies this geographic imbalance. Major solar power plants, wind farms, and bioenergy facilities require large, isolated locations, which makes it difficult for women to participate in operational tasks and hands-on training.

Women's difficulty in getting around stems from not having safe ways to travel, societal rules that limit their ability to travel, and increased safety concerns for women working at project locations designed for technical tasks. The combined effect of remote job locations and unequal mobility further isolates women from environmentally friendly job opportunities that require physical presence in the field. From a sociocultural perspective, the shift towards an environmentally friendly economy is also shaped by deeply ingrained masculine standards linked to jobs that are technical or involve outdoor work. Numerous environmentally focused areas, such as renewable energy and building environmental infrastructure, are seen as needing physical power, skill with machines, and bravery in tough work conditions, features typically linked to men.

These standards create stereotypes that suggest women are not as skilled in technical roles, causing employers to question women's skills before they can demonstrate their capabilities. Research on gender within the energy industry indicates that women frequently face unfair opinions about their technical skills, starting from the first hiring steps (Clancy, 2020). Such societal standards damage women's faith in their own abilities and affect what they decide to study and what jobs they consider from a young age. Consequently, it makes sense that women generally steer clear of job paths in fields seen as very male-dominated, even if these jobs provide better pay and more job security. An outsized share of domestic responsibilities presents considerable obstacles. Typically, Indonesian women shoulder the majority of household tasks, including cleaning, raising children and caring for older relatives. This burden at home curtails the time women have available to spend on education or to improve their skills. Because green technology evolves quickly, green jobs necessitate ongoing learning and improvement of abilities.

Women fall behind in gaining the necessary skills to be competitive in the green industry when they are time-constrained because of the unequal distribution of work in their households. Studies on labor and gender show that inadequate flexibility and time are substantial impediments that prevent women from participating in technical training (International Labour Organization, 2022). Conventional ideas about the roles of women make these obstacles even more challenging, as domestic duties and caregiving are prioritized over work outside the home. Such deeply ingrained societal expectations deter women from getting involved in fields seen as technical or difficult, which reduces the possibility of their choosing a green job initially.

These sociocultural elements are exacerbated by the insufficient number of women involved in the energy and environmental fields, creating a self-reinforcing problem. The belief that green industries are unsuitable for women becomes further entrenched in society due to the rare visibility of women in leadership or technical roles within these areas. Because of this underrepresentation, women have fewer opportunities to build professional connections that could help them with their careers by providing mentoring, information access, and support. Professional networks are a vital part of securing competitive employment in the environmentally friendly sector. Due to the absence of female role models in the clean energy field, young women are less likely to pursue careers in this area, which sustains gender disparity across generations.

Institutional obstacles worsen the disparities experienced by Indonesian women in obtaining green jobs. The primary deficiency is the absence of a nationwide green transition strategy that incorporates gender-aware budgeting. Gender-aware budgeting is crucial for guaranteeing that how resources are allocated, how training is paid for, and how infrastructure is planned all consider what women actually need. Without this method, many plans for green transition are made without considering gender, which means they do not see the specific challenges that women face. Consequently, renewable energy projects

are often implemented without considering their impact on gender, which prevents women from having the same chance benefiting equally from these initiatives.

Studies show that using gender-aware budgeting can make environmental policies work better and give women more opportunities to enter new economic areas (UN Women, 2023). However, in Indonesia, it is still not used much and is mostly limited to just a few government departments; it has not yet become the usual way of doing things in the energy and environment fields. Another problem in the system is that renewable energy companies do not have good ways to check or monitor how well they treat men and women. Without these checks, companies do not care about unfair treatment in their workforces. They also do not collect data that separates men and women, so they cannot see how women are being left out when it comes to getting promoted, trained, or hired. Without this data, issues of unfairness go unnoticed and are not fixed by the company's rules.

Studies on how energy companies are run suggest that checking on gender issues can help spot problems in hiring and promotion and make the workplace better for everyone (Bhattacharyya 2021). However, these checks are not common in the energy industry in Indonesia. Another issue is that the work environment is not friendly to women in green jobs. Many renewable energy companies do not have policies or facilities that consider women's needs. For example, they do not offer childcare, safe bathrooms for women on project sites, or safety rules that address risks specific to women. When companies do not provide a safe and welcoming workplace, women are less likely to join the clean energy field, even though there are promising job opportunities.

This exacerbates gender gaps and makes it harder to have a fair transition to clean energy. Research shows that a safe and inclusive environment is key to increasing the number of women in technical and field jobs. These barriers show that the difficulties Indonesian women face in obtaining green jobs are not just about personal choices. They come from a mix of educational systems, job locations, strict social rules, and policies that are not fully aware of gender issues. For the shift to a green economy to work fairly for everyone, Indonesian policies must take several steps simultaneously. This includes changing vocational education, expanding local training programs, providing safe work environments, and ensuring that gender considerations are part of audits and budgeting in the energy sector. If these wide-ranging actions are not taken, women will continue to face more risks and miss out on the new opportunities the green economy should bring for all.

4.4 The Role of Global Cooperation in Reducing the Gender Gap in Green Jobs

Global cooperation plays a crucial role in opening opportunities for women to enter Indonesia's green job sector. Technology transfer, capacity support, and international funding requiring gender integration from institutions such as the GCF, GEF, and various bilateral partners have helped expand women's access to green training and skills. Renewable energy programs, including technical cooperation with countries such as Denmark through the Energy Transition Initiative, provide training modules that enable women to acquire basic technical skills, ranging from solar power system installation to clean energy equipment maintenance.

In some regions, this training is combined with mentoring and community empowerment models, opening up opportunities for social and economic mobility for women previously concentrated in low-value jobs. However, these opportunities are often limited by the domestic barriers. The gap between global standards and local capacity, or the implementation gap, means that gender integration in international projects is not always effective at the local level. Challenges such as inter-agency coordination, limited gender expertise, and social biases regarding technical work still prevent women from harnessing the full potential of international programs are still present. Several international reports also indicate that without improved inter-agency coordination and more comprehensive policy reforms, global efforts to increase women's roles in the green economy could be slow.

Thus, while global cooperation offers important opportunities for Indonesian women, its impact depends heavily on the domestic capacity to absorb, adapt, and implement gender inclusion standards introduced by donors and international partners. In various development cooperation programs, JICA

and KOICA have integrated gender-responsive training components into training programs related to renewable energy, waste management, and circular economy. Although some projects do not release detailed quantitative data, both institutions have official policies on gender mainstreaming. JICA's "Gender Mainstreaming in the Energy Sector" document emphasizes that all technical training must provide opportunities for women to access clean energy skills, including participants from vocational schools and rural communities. A similar principle is also stated in the "KOICA Gender Equality Policy," which requires KOICA projects to include a capacity-building component for women, particularly in technical fields.

This institutional evidence demonstrates that international cooperation not only transfers technology but also systematically opens women's access to the green skills needed in a green economy (JICA 2021). A second opportunity arises from international funding, which increasingly emphasizes gender components in green economy projects. Institutions such as the Green Climate Fund (GCF) and the Global Environment Facility (GEF) require that every project proposal include a gender analysis, sex-disaggregated indicators, and an action plan to ensure that women benefit equally from energy transition programs. This requirement has a direct impact on clean energy projects in Indonesia, including renewable energy initiatives in Sumatra and green mobility development in Jakarta, which integrate technical training for women and promote increased access to green technology-related jobs.

The GEF report on gender integration in Indonesian projects also shows that mandatory gender components help expand women's participation in green skills, including in areas such as energy-system design and clean transportation technology. Thus, international funding not only provides financing but also acts as a normative mechanism to promote gender inclusion in Indonesia's green economy (GEF, 2022). The ILO Green Jobs Programme and UN Women also make important contributions to expanding women's capacity to enter the green jobs sector through skills-based modules and training programs. These programs generally focus on strengthening women's leadership, sustainability education, and improving technological literacy in response to cultural and structural barriers that limit women's access to technical training programs.

ILO and UN Women reports indicate that gender-inclusive training approaches, including online workshops and accessible learning materials, help increase women's confidence and job readiness for engagement in the green sector. In some regions, such as Yogyakarta, UN Women initiatives collaborate with local governments and educational institutions to expand women's access to training related to the green economy and sustainable project management. Furthermore, the development of digital platforms within some programs helps reduce geographic barriers for women in remote areas, enabling more equitable access to the green skills needed for the transition to a low-carbon economy (UN, 2022).

Collaboration with multinational companies also provides important opportunities to improve gender equality standards in Indonesia's green job sector. Many global green technology companies, such as Siemens and Vestas, implement equal employment opportunity (EEO) and gender parity policies in their supply chains and production facilities in various countries. Although not all of these policies are directly implemented in Indonesia, partnerships with the government and vocational education institutions contribute to the spread of more inclusive employment practices, including the recruitment of women for technical positions, gender-inclusive training programs, and the provision of more flexible work arrangements for female workers.

In their sustainability reports, Siemens and Vestas emphasize that gender diversity in the renewable energy sector improves innovation and product design quality, including the development of battery technology and energy efficiency. This demonstrates that global cooperation between governments and the transnational private sector can accelerate the adoption of inclusive employment standards, open greater opportunities for women to enter green industries, and support Indonesia's low-carbon economic transformation (Sustainability Report 2022). However, challenges arise when gender standards set by international institutions are not fully translated into national policies.

Various program evaluations have shown that the integration of gender indicators into donor projects is often hampered by institutional capacity, inter-ministerial coordination, and complex administrative

processes at the government level. In the context of GCF and GEF projects in Indonesia, several reports have noted delays in implementation or readjustment of work plans due to the need to harmonize donor requirements and domestic bureaucratic procedures. This creates a gap between gender commitments stated in proposals and practices on the ground, particularly when human resources with gender expertise and green skills are limited in number. These administrative obstacles are exacerbated by changes in rice policy. National programs do not explicitly incorporate a gender perspective; therefore, the implementation of women's inclusion programs in the green sector does not always achieve the targets set at the planning stage (GCF, 2019).

Women's access to international programs is also hampered by several structural factors. Many training programs conducted by the ILO and UN Women use materials in English or require specific digital literacy skills; therefore, women in rural areas or those with secondary education often face initial barriers to participation. Another challenge arises from complementary costs, such as transportation and free time, which make it more difficult for women from vulnerable groups to participate in intensive training, particularly in the renewable energy and green economy sectors.

Several reports indicate that the representation of women from areas outside Java remains low, indicating persistent disparities in access to training between regions. These difficulties indicate an implementation gap, where inclusive global standards are not fully absorbed into the domestic context. Although multinational companies and donor agencies have introduced more gender-responsive labor standards, local practices are often influenced by cultural norms, institutional capacity, and limited coordination mechanisms.

Evaluations by agencies such as the GEF and UN Women emphasize that without long-term monitoring support, organizational reform, and local government involvement, women's inclusion in green projects is likely to fall short of the established targets. Furthermore, geopolitical dynamics and uncertainty surrounding international funding have the potential to weaken the sustainability of gender inclusion programs. Addressing these gaps requires stronger domestic policy reforms, including the integration of gender indicators into energy and environmental policies and closer collaboration between governments, donors, the private sector, and civil society (UN Women, 2022).

4.5 Gap Analysis between Global Standards and National Realities

The growth of a green economy worldwide has created a set of rules that focus on fairness and equal treatment for all genders as the key to moving towards a cleaner, lower-carbon future. The Paris Agreement and goals 5 and 8 of the Sustainable Development Goals push countries to ensure that moving to clean energy creates jobs and economic opportunities for everyone, regardless of who they are. In this context, women are considered important in driving this change, and they need to be fully involved in new technologies, the growing renewable energy sector, and the changing green economy. However, in Indonesia, there is a significant difference between these global goals and what is actually happening in the country.

Consequently, women's involvement in green jobs has not improved significantly, despite the global push for more inclusive and fair policies. Global teamwork opens up many opportunities for developing countries by offering money, sharing technology, and setting rules that support women's participation in the green industry. For example, funds such as the Green Climate Fund help women gain better access to training in renewable energy, tools that help adapt to climate change, and programs that support starting businesses in the green field. Denton states that global climate money is meant to fix the fact that women have not had equal access to clean technologies, which have mostly been used by men.

In addition, groups such as the International Renewable Energy Agency state that moving towards clean energy requires women to be involved in all parts of the process, from research to implementation and management (International Renewable Energy Agency, 2022). If these global efforts are taken seriously, there should be more opportunities for women in Indonesia to work in the green sector. However, these opportunities have not been fully realized because domestic issues prevent the proper incorporation of global standards into national policies. Arutyunova and Clark pointed out that many developing

countries only make a show of adopting global promises without creating systems to ensure that these commitments match local needs.

This is also seen in Indonesia's green transition plan, which focuses mainly on technical aspects, aiming to meet emission goals and attract investments, but has not yet included a broader social change effort that addresses gender inequality. Consequently, women continue to be excluded from the growing green workforce in developing countries. This inequality becomes clearer when examining how the budget helps move towards a greener future. Although there is a global plan that encourages the use of gender-sensitive budgeting that considers gender, most renewable energy policies in Indonesia have not adopted this approach.

Therefore, the policies appear fair but still create unfair advantages that hurt women. Razavi stated that policies that seem neutral can actually worsen inequalities if the organizations carrying them out still follow traditional male-centered rules. This is evident in training programs for clean energy jobs that do not consider gender issues, such as the extra work women often do at home or their limited mobility to move around. At the industry level, there is a clear mismatch with global standards in the way renewable energy companies operate. Many of these companies have not implemented gender audits, safety rules that consider women's needs, or services such as childcare support.

This is despite international guidelines, such as the Environmental Social Governance and Gender Equality in Energy Framework, stressing the importance of considering gender in managing clean energy. Clancy notes that in developing countries, the energy sector often sees technical jobs as gender-neutral, even though there is plenty of evidence showing that gender biases still exist strongly (Clancy, 2020). This is also happening in Indonesia's solar and bioenergy industries, where there are no consistent standards that make work more friendly for women workers.

The difference between international standards and local conditions creates a situation where there are opportunities, but the ability to use them is limited. International guidelines aim to include everyone; however, national systems have not yet developed the necessary policies to support women's equal involvement in the green industry. Consequently, women's involvement remains unchanged, despite the growing push for a fairer green economy. This shows that Indonesia's move towards a greener future is still focused on technical solutions and has not included efforts to change gender roles. Without matching international goals with national plans, women will continue to be excluded from the rapidly growing green sector.

4.6 Theoretical and Practical Implications

The theoretical implications of this study provide important contributions to the literature on green economy and gender justice. The research findings reinforce the intersectionality perspective, which explains how women's gender identities interact with social, cultural, and institutional contexts to determine their access to green jobs. This challenges the assumption that the transition to a green economy is automatically inclusive and demonstrates the need for structural transformations to enable equal female participation in this emerging sector. This study also reinforces feminist development literature (Boserup, 2007), which emphasizes that economic development cannot be separated from the dimension of gender justice.

Furthermore, this study broadens the green economy discourse by highlighting the implementation gap as a critical issue in global cooperation, specifically when international gender standards are not fully aligned with domestic capacity. This perspective opens up space for future research on the effectiveness of policy design and international aid mechanisms to ensure gender integration in the green sector. These findings provide guidance for policymakers, donor agencies, and private sectors. The Indonesian government needs to strengthen its green job policy framework by more consistently integrating gender indicators into planning and monitoring, including expanding women's access to technical and digital training relevant to the green economy.

Donor agencies, such as the GCF and GEF, also need to improve supervision and coordination mechanisms with local governments to ensure that the gender standards outlined in the proposal can be effectively implemented on the ground. Furthermore, multinational companies and the national private sector play crucial roles in adopting inclusive employment practices, such as providing competency-based training, creating supportive work environments, and addressing the needs of female workers. Closer collaboration between the government, donor agencies, the private sector, and civil society is key to ensuring that the transition to a green economy generates economic growth and strengthens gender equity and social resilience at the national level.

5. Conclusion

5.1 Limitation

This study had several important limitations that should be considered when interpreting the findings. First, the analysis relies heavily on secondary data from international agencies, such as the ILO, UN Women, and the World Bank. Thus, it does not fully capture local variations or regional contexts in Indonesia, particularly in areas that are underrepresented in national surveys. Many international reports also do not provide in-depth disaggregated data for specific subgroups, such as women with disabilities, informal workers, or ethnic minority groups, potentially creating a representational bias. Second, due to the limitations of longitudinal studies on gender-based green jobs in Indonesia, the findings regarding the implementation gap are indicative and cannot be verified in the long term.

Third, the study's focus on Indonesia limits its generalizability to other Southeast Asian countries with different economic structures and social norms. Furthermore, the COVID-19 pandemic has impacted the availability and consistency of data in recent years, which may impede the comparison of trends before and after 2020. Fourth, the use of international donor reports potentially carries certain institutional biases, as these documents often highlight program successes for accountability purposes, potentially under-representing critical evaluations of implementation barriers. These limitations indicate the need for future research using mixed methods, primary data, and area-based approaches to provide a more comprehensive and accurate understanding of gender in green jobs in Indonesia.

5.2 Suggestion

Based on the results of this study, several important suggestions can help shape policies and guide future research. First, the government should work more closely with other countries to ensure that money for green projects, technology sharing, and training programs includes fairness for all genders as a main part. This helps to make global standards part of local practices in a better way. Second, the study recommends changes to national rules so that all programs aimed at energy change, such as solar, bioenergy, and energy efficiency, include budgets that consider gender. Third, schools and organizations that provide job skills and certifications should adopt a training model that is fair to all genders. This involves making course content free from gender bias, providing better support for women, and working with companies to create safer and more welcoming job opportunities. The research highlights that a successful green economy depends not only on new technologies and foreign support but also on how well a country allows women to have the same chances, opportunities, and abilities during the shift to greener practices. Including gender in all areas (rules, culture, and institutions) is crucial for building a fair and equal green economy.

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