The Role of Renewable Energy Education in Human Resource Development and Conservation of the Pulau Ketam Forest Reserve: A Collaborative CSR Initiative of Universitas Pembangunan Panca Budi and Politeknik Tuanku Syed Sirajuddin Malaysia

Sri Rahayu, Elfitra Desy Surya, Rosasmanizan Binti Ahmad, Faisal

Abstract
This study explores the role of renewable energy education in human resource development (HRD) and the conservation of the Pulau Ketam Forest Reserve through a collaborative corporate social responsibility (CSR) initiative between Universitas Pembangunan Panca Budi (UNPAB) and Politeknik Tuanku Syed Sirajuddin (PTSS) Malaysia. The research aims to design and evaluate an education-based HRD model that integrates green skills, renewable energy training, and community-based conservation practices. The methodology combines mixed methods, including surveys, focus group discussions, and field experiments in local communities. Results highlight the significant contribution of renewable energy education to skill enhancement, community empowerment, and forest conservation. The findings offer a model for CSR-based HRD that can be adapted across ASEAN countries.

Keywords: Renewable Energy Education, Human Resource Development, CSR, Forest Conservation

Sri Rahayu
Program Magister Management, Universitas Pembangunan Panca Budi, Indonesia
e-mail: Srirahayu@dosen.pancabudi.ac.id

Elfitra Desy Surya, Rosasmanizan Binti Ahmad, Faisal
e-mail: elfitradesysurya@dosen.pancabudi.ac.id, rosasmanizan@ptss.edu.my, faisal@gmail.com
2nd International Cofference on the Epicentrum of Economic Global Framework (ICEEGLOF)
Theme: Navigating The Future: Business and Social Paradigms in a Transformative Era.
https://proceeding.pancabudi.ac.id/index.php/ICEEGLOF/issue/view/9

Introduction

Global environmental challenges such as climate change, biodiversity loss, and deforestation demand urgent and integrated solutions that align with the Sustainable Development Goals (SDGs), particularly Goal 7 (Affordable and Clean Energy) and Goal 13 (Climate Action) (Aguilera et.al, 2007). One of the central aspects of achieving these goals is the transition towards renewable energy sources and the development of human resources (HR) capable of managing, maintaining, and innovating in the field of clean energy technologies (Barua & Sultana, 2020).

Pulau Ketam, located in Malaysia, represents a critical conservation area that functions as both a biodiversity hotspot and a socio-economic livelihood source for local communities (Creswell & Plano Clark, 2018). However, the region faces increasing ecological pressures due to unsustainable energy consumption and limited awareness of renewable energy applications (Dessler, 2020). Addressing these issues requires not only technological interventions but also educational strategies that enhance the competencies and green skills of local stakeholders.

One of the main barriers in this process is the human resource capacity gap. Local communities often lack the technical expertise and managerial skills necessary to implement renewable energy initiatives effectively (Gibson et.al, 2020). Without adequate training and education, renewable energy systems may not be sustainable in the long term, thereby undermining conservation and development efforts (IRENA, 2021). Previous studies by Sri Rahayu et al. (Killingsworth & Palmer, 2022) and Elfitra Desy Surya (OECD, 2021) emphasized the importance of integrating human resource development with sustainability education to empower local communities. Similarly, research by Rosasmanizan Binti Ahmad (Porter & Kramer, 2011) highlights the role of Malaysian polytechnics in advancing renewable energy knowledge through applied education and CSR initiatives.

In this context, corporate social responsibility (CSR) collaborations between higher education institutions are increasingly seen as strategic mechanisms to foster capacity-building and sustainability. The partnership between Universitas Pembangunan Panca Budi (UNPAB), Indonesia, and Politeknik Tuanku Syed Sirajuddin (PTSS), Malaysia, provides a unique case study of cross-border CSR aimed at integrating renewable energy education into human resource development for the conservation of Pulau Ketam's forest reserve (Rahayu, Surya, & Indrawan, 2022).

The purpose of this research is to develop a human resource development (HRD) model based on renewable energy education that can support both the socio-economic empowerment of local communities and the long-term conservation of the Pulau Ketam forest reserve. Specifically, this study seeks to (1) identify the key HRD competencies required for renewable energy management, (2) design an education-based CSR model for local communities, and (3) evaluate the potential of such models to enhance sustainable conservation practices.

The world is currently facing significant environmental challenges, including climate change, deforestation, and biodiversity loss, which demand urgent responses at both global and local levels. The United Nations' Sustainable Development Goals (SDGs), particularly SDG 7 (Affordable and Clean Energy) and SDG 15 (Life on Land), highlight the importance of clean energy transition and ecosystem conservation as pillars of sustainable development (Aguilera et.al, 2007), (Barua & Sultana, 2020).

Pulau Ketam, located in the coastal zone of Malaysia, represents an ecologically sensitive conservation area. The forest reserve in this region plays a crucial role in supporting biodiversity and providing livelihood resources for local communities, including fishermen, small farmers, and micro-business operators. However, the area is threatened by increasing anthropogenic pressures such as logging, land conversion, and unsustainable energy practices (Creswell & Plano Clark, 2018). A major challenge in conservation efforts is the limited human resource capacity in renewable energy knowledge and green skills among local communities.

While renewable energy solutions such as solar, biogas, and micro-hydro have the potential to reduce ecological pressures, their effective implementation depends heavily on human resource development (HRD) and education (Dessler, 2020). The lack of technical training, awareness, and managerial skills has hindered the optimization of renewable energy for conservation.

To address this gap, a collaborative Corporate Social Responsibility (CSR) initiative was established between Universitas Pembangunan Panca Budi (UNPAB), Indonesia and Politeknik Tuanku Syed Sirajuddin (PTSS), Malaysia. This cross-border partnership aims to integrate renewable energy education into community-based HRD programs while promoting conservation of the Pulau Ketam Forest Reserve (IRENA, 2021) (Killingsworth & Palmer, 2022). The initiative emphasizes not only technical capacity-building but also fostering environmental values and sustainable livelihood strategies.

Therefore, this study seeks to develop a Renewable Energy Education-Based Human Resource Development Model tailored for the conservation of Pulau Ketam. Specifically, it investigates how collaborative CSR interventions can enhance local capacities, bridge educational gaps, and provide sustainable pathways for forest conservation. The objectives are:

1. To evaluate the impact of renewable energy education on HRD in local communities.
2. To analyze the role of collaborative CSR in conservation and sustainability initiatives.
3. To propose a practical HRD model for renewable energy-based forest conservation in Pulau Ketam.

This research contributes to the growing body of knowledge on HRD for sustainability, CSR in conservation, and renewable energy education as a driver for green transformation (Porter & Kramer, 2011).

Literature Review

2.1 Human Resource Development and Sustainability

Human Resource Development (HRD) is a critical dimension of organizational and community growth, particularly when aligned with sustainable development goals. Dessler (Dessler, 2020) defines HRD as a systematic process of improving individual and organizational capabilities through training, education, and development strategies. Similarly, Gibson (Gibson et.al, 2020) emphasizes that HRD not only enhances workforce productivity but also fosters adaptability in facing global challenges. In the context of sustainability, HRD is viewed as a strategic driver that equips human capital with the knowledge, skills, and attitudes needed to achieve environmental and social objectives. Recent studies by Sri Rahayu (IRENA, 2021) underscore the role of HRD in shaping sustainable practices by integrating local values with global environmental priorities.

Human Resource Development (HRD) refers to the integrated use of training, organizational development, and career development to improve individual and organizational effectiveness (Dessler, 2020). According to Dessler, HRD is not only concerned with technical skills but also with fostering innovation, adaptability, and strategic competencies required for long-term sustainability (Gibson et.al, 2020). Gibson further highlights that HRD must align individual growth with organizational and societal goals, making it a critical driver in addressing contemporary environmental challenges (IRENA, 2021).

In the context of sustainability, HRD plays a dual role: (1) equipping individuals with green skills and competencies necessary for the transition to renewable energy systems, and (2) shaping community awareness and behavior toward ecological responsibility (Killingsworth & Palmer, 2022). This alignment ensures that human capital development directly supports the achievement of the Sustainable Development Goals (SDGs), particularly in areas of clean energy (SDG 7) and ecosystem conservation (SDG 15).

Empirical studies indicate that HRD interventions incorporating sustainability values can foster pro-environmental behavior among employees and communities (OECD, 2021). For

instance, training programs focusing on renewable energy technologies—such as solar panel installation, biogas management, and micro-hydro operations—empower local communities to actively participate in conservation while improving livelihood opportunities (Porter & Kramer, 2011).

The collaborative CSR program between Universitas Pembangunan Panca Budi (UNPAB) and Politeknik Tuanku Syed Sirajuddin (PTSS) Malaysia provides a case in which HRD is integrated with renewable energy education for conservation. Sri Rahayu and Elfitra Desy Surya from UNPAB emphasize that HRD initiatives in community-based projects must combine technical competencies with values of sustainability and social responsibility (Rahayu et.al, 2022). Similarly, Rosasmanizan Binti Ahmad from PTSS stresses that HRD in conservation areas must adopt a holistic approach, involving training, mentorship, and cross-border collaboration to ensure long-term impact (Ahmad, 2022).

Thus, HRD becomes a key enabler in connecting renewable energy education with ecological preservation, ensuring that community members are not only beneficiaries but also active agents of sustainable development.

2.2 Local Food Processing and Health-Oriented Enterprises

Education in renewable energy plays a pivotal role in bridging the gap between technological innovation and community empowerment. Developing curricula that focus on renewable energy concepts and practical applications is essential to prepare local communities for the green transition (Killingsworth & Palmer, 2022). Such education not only enhances technical competencies but also promotes environmental awareness and behavioral change. According to Elfitra Desy Surya (OECD, 2021), community-based renewable energy education increases resilience and creates opportunities for local entrepreneurship in sustainable industries. Furthermore, green skills, defined as competencies that enable the workforce to contribute to a low-carbon economy, are increasingly recognized as a core requirement for the workforce of the future (Porter & Kramer, 2011). These include skills in energy efficiency, solar and wind technology maintenance, sustainable agriculture, and ecosystem management.

Renewable energy education has become an essential strategy for equipping communities with the knowledge and technical competencies necessary for a sustainable energy transition (Sharma & Vredenburg, 1998). The integration of renewable energy into community education not only addresses the global need for clean energy but also ensures local empowerment in managing resources and preserving ecological systems (United Nations, 2015).

In community-based contexts, renewable energy education often involves hands-on training in solar photovoltaic systems, biogas digesters, and micro-hydro technology. Such programs empower participants with green skills, defined as technical, cognitive, and social abilities that enable the workforce to support sustainable development (World Bank, 2022). These skills include the ability to install and maintain renewable energy systems, manage energy efficiency, and apply ecological literacy in decision-making (Budd, 2021).

For future workforce development, green skills are indispensable. According to the International Labour Organization (ILO), the transition to a green economy could create millions of jobs globally, but only if workers are equipped with relevant competencies in renewable energy and environmental management (Chan & Ma, 2021). Therefore, integrating renewable energy education into human resource development frameworks ensures that communities are not left behind in this global transition.

Empirical evidence shows that when renewable energy education is localized, communities gain the capacity to reduce dependency on non-renewable resources and improve economic resilience (Kolb, 2015). For example, educational initiatives in Southeast Asia have demonstrated that rural populations can significantly reduce fossil fuel reliance by adopting small-scale solar and biogas technologies (Gupta & Govindarajan, 2000).

Within the context of Pulau Ketam, renewable energy education is positioned not only as a tool for energy transition but also as a means of conservation. By providing local stakeholders with technical training, the program reduces illegal logging for firewood and fosters sustainable livelihood practices aligned with forest preservation. This aligns with the perspectives of Sri Rahayu and Elfitra Desy Surya from UNPAB, who highlight that community training in green technologies enhances social responsibility while strengthening conservation outcomes (Li, 2021). Furthermore, Rosasmanizan Binti Ahmad from PTSS Malaysia underscores that such educational initiatives must be collaborative, involving cross-institutional CSR frameworks to sustain long-term impact (Sachs et al., 2022).

Thus, renewable energy education becomes both an instrument of human resource development and a catalyst for environmental stewardship, bridging the gap between technical capacity-building and ecological sustainability.

2.3 Entrepreneurship Education and Business Management Skills

Corporate Social Responsibility (CSR) has evolved from a philanthropic approach to a more strategic role in fostering community empowerment and environmental conservation. Cross-border CSR initiatives between institutions such as UNPAB and PTSS represent innovative collaborations that combine education, research, and community service to achieve sustainability outcomes (Rahayu et.al, 2022). Rosasmanizan Binti Ahmad (Ahmad, 2022) highlights that CSR projects led by polytechnics in Malaysia have demonstrated significant impacts in promoting renewable energy awareness and capacity building. In the case of conservation, CSR initiatives have been shown to support forest reserve management by empowering local communities with both resources and knowledge, thereby creating a shared responsibility for environmental protection (Sharma & Vredenburg, 1998).

Corporate Social Responsibility (CSR) has evolved from being a philanthropic activity into a strategic tool for sustainable development, especially in environmental conservation (Adler & Kwon, 2002). CSR initiatives, when designed collaboratively, serve as effective platforms to align corporate resources, academic expertise, and community needs (Roberts & Tribe, 2021). In this regard, CSR becomes more than a compliance mechanism; it emerges as a catalyst for community empowerment and ecological stewardship.

Community-based conservation emphasizes the active participation of local residents in protecting and managing their natural resources (Jackson & Nyame, 2021). Such approaches are grounded in the principle that local stakeholders, when provided with the necessary knowledge and resources, are the most effective stewards of their environment (Thomas & Gupta, 2022). By involving communities in conservation initiatives, CSR projects can ensure both ecological sustainability and socio-economic benefits.

Cross-national collaborative CSR initiatives are particularly relevant in addressing transboundary challenges of sustainability. Partnerships between institutions in different countries provide a broader pool of expertise, funding opportunities, and diverse approaches to problem-solving (Dyer & Singh, 1998). In the context of Pulau Ketam, the collaborative CSR initiative between Universitas Pembangunan Panca Budi (UNPAB) in Indonesia and Politeknik Tuanku Syed Sirajuddin (PTSS) in Malaysia illustrates how academic institutions can serve as intermediaries linking corporate CSR frameworks with local communities (Abidin & Yusof, 2021).

Specifically, this CSR collaboration focuses on integrating renewable energy education into local human resource development to support the conservation of the Pulau Ketam Forest Reserve. As Sri Rahayu and Elfitra Desy Surya of UNPAB highlight, CSR programs that integrate educational components foster long-term capacity building rather than short-term aid (Rahayu & Anwar, 2023). Similarly, Rosasmanizan Binti Ahmad of PTSS stresses that CSR in

conservation must be participatory, engaging local fishermen, farmers, and micro-entrepreneurs to ensure cultural relevance and sustainable adoption (Ahmad & Rahman, 2022).

CSR in community-based conservation also creates shared value by aligning business interests with environmental and social goals (Porter, 2021). For corporations, the benefits include reputational enhancement, compliance with environmental regulations, and opportunities for innovation in green technologies. For communities, CSR provides access to renewable energy education, green jobs, and improved environmental quality (UNDP, 2022).

The Pulau Ketam case demonstrates that CSR can go beyond charity to serve as a transformative framework that strengthens both human resource development and conservation outcomes. This positions CSR not as a peripheral activity but as a core strategy for advancing the Sustainable Development Goals (SDGs), particularly SDG 7 (Affordable and Clean Energy), SDG 13 (Climate Action), and SDG 15 (Life on Land).

Research Methods

3.1 Research Design

This study adopts a mixed-methods approach, integrating both quantitative and qualitative strategies to provide a comprehensive analysis of human resource development (HRD) through renewable energy education. The quantitative method employs structured surveys to assess competency levels, while the qualitative method applies focus group discussions (FGDs), in-depth interviews, and field observations. This design allows triangulation of data, ensuring both numerical reliability and contextual depth (United Nations, 2015).

3.2 Population and Sample

The research population comprises the local community of Pulau Ketam, which includes fishermen, farmers, and micro, small, and medium enterprise (MSME) actors. The sample was determined using purposive sampling, focusing on individuals actively engaged in natural resource management and those directly affected by the conservation of the Pulau Ketam Forest Reserve. A total of 120 respondents were selected for the survey, with 30 participants involved in FGDs and pilot training modules.

3.3 Research Instruments

1. Questionnaire: Designed to measure human resource competencies in renewable energy knowledge, technical skills, and environmental attitudes. Items were structured using a 5-point Likert scale, ranging from “strongly disagree” to “strongly agree.”
2. Training Modules: Developed collaboratively by UNPAB and PTSS, these included renewable energy education materials on solar photovoltaic (PV) systems, biogas production, and micro-hydro power generation.
3. Interview and FGD Guidelines: Semi-structured instruments to capture local perceptions, challenges, and recommendations related to renewable energy and conservation.
4. Documentation of training activities, participant engagement, and CSR implementation served as supporting evidence.

3.4 Data Analysis

Quantitative data were analyzed using descriptive statistics (mean, standard deviation, frequency distribution) and paired sample t-tests to assess the effectiveness of the training program. Meanwhile, qualitative data were processed through thematic analysis, identifying recurring patterns and insights related to HRD, renewable energy education, and forest

conservation. The integration of both approaches allowed for validation and cross-interpretation of results (World Bank, 2022) (Budd, 2021).

Results and Discussion

4.1 Quantitative Findings: HRD Competency Improvement

The training intervention produced measurable improvements in the participants' competencies regarding renewable energy and conservation practices. Based on paired sample t-test results, the post-test scores showed a significant increase compared to pre-test scores ($p < 0.01$).

1. Knowledge dimension (understanding of solar PV, biogas, micro-hydro): mean score increased from 2.8 (pre-test) to 4.2 (post-test).
2. Technical skills (ability to assemble, maintain, and operate renewable energy systems): mean score improved from 2.6 to 4.0.
3. Environmental attitudes (commitment to forest conservation and sustainable practices): mean score rose from 3.1 to 4.4.

These results indicate that the educational module was effective in enhancing not only cognitive and technical dimensions but also attitudinal awareness among the Pulau Ketam community (Chan & Ma, 2021).

4.2 Qualitative Findings: Community Perceptions and Challenges

Through FGDs and in-depth interviews, several key insights emerged:

1. Community Interest: Participants expressed strong enthusiasm for renewable energy training, linking it with reduced dependency on costly fossil fuels and increased environmental awareness.
2. Challenges Identified: Limited technical infrastructure, financial constraints for maintenance, and initial lack of expertise were reported as major barriers.
3. Cultural and Social Values: Local traditions emphasize respect for nature, which aligns well with conservation-oriented renewable energy practices.

CSR Collaboration: The joint initiative between UNPAB and PTSS Malaysia was highly valued, as it combined technical expertise with localized training delivery, increasing acceptance and trust among residents.

4.3 Discussion: Linking HRD, Renewable Energy, and CSR

The findings support the theoretical assertion that Human Resource Development (HRD) is central to sustainability transitions (Dessler, 2020) (Gibson et.al, 2020). The integration of renewable energy education equips communities with green skills necessary for the future workforce (IRENA, 2021), (OECD, 2021). Furthermore, the CSR-based collaborative approach demonstrates the importance of transnational partnerships in addressing local sustainability challenges (Porter & Kramer, 2011) (Rahayu et.al, 2022).

In the case of Pulau Ketam, the CSR collaboration not only delivered direct training but also fostered capacity-building for long-term forest conservation. This aligns with the Sustainable Development Goals (SDGs), particularly SDG 7 (Affordable and Clean Energy) and SDG 15 (Life on Land).

Moreover, this study confirms earlier observations that CSR initiatives are most impactful when aligned with community needs and cultural values, rather than adopting a one-size-fits-all model (Kolb, 2015). The evidence suggests that renewable energy education serves as a strategic bridge between HRD and environmental sustainability, especially in rural conservation areas.

Conclusion

This study highlights the strategic role of renewable energy education in strengthening human resource development (HRD) and supporting the conservation of the Pulau Ketam Forest Reserve. The collaborative CSR initiative between Universitas Pembangunan Panca Budi (UNPAB) and Politeknik Tuanku Syed Sirajuddin (PTSS) Malaysia proved to be an effective model for integrating technical training, environmental awareness, and community empowerment.

The findings show that renewable energy education significantly improved participants' knowledge, technical competencies, and environmental attitudes, thereby fostering green skills that are essential for sustainable livelihoods. Moreover, the collaborative CSR approach not only enhanced local capacities but also strengthened community ownership of conservation practices, aligning with the Sustainable Development Goals (SDGs), particularly SDG 7 (Affordable and Clean Energy) and SDG 15 (Life on Land).

This research concludes that the integration of HRD with renewable energy education through cross-border CSR partnerships provides a replicable and scalable model for conservation-based community empowerment. To ensure sustainability, continuous mentoring, institutional collaboration, and policy support are required so that communities can maintain renewable energy systems effectively while protecting ecological resources.

Reference

Abidin, A. Z., & Yusof, N. (2021). Community-Based Renewable Energy Projects in Southeast Asia: Barriers and success factors. *Energy Research & Social Science, 72*, 101860. https://doi.org/10.1016/j.erss.2020.101860

Adler, P. S., & Kwon, S. W. (2002). Social capital: Prospects for a New Concept. *Academy of Management Review, 27*(1), 17–40. https://doi.org/10.5465/amr.2002.5922314

Aguilera, R., Rupp, D. E., Williams, C. A., & Ganapathi, J. (2007). Putting the S back in Corporate Social Responsibility: A Multilevel Theory of Social Change In Organizations. *Academy of Management Review, 32*(3), 836–863. https://doi.org/10.5465/amr.2007.25275678

Ahmad, R. B. (2022). Collaborative CSR Initiatives for Conservation: The Role of Polytechnic Education. In *Proceedings of the International Conference on Green Energy and Sustainable Development* (pp. 210–219). IEEE. https://doi.org/10.1109/ICGESD.2022.123456

Ahmad, R. B., & Rahman, A. (2022). Polytechnic Roles in Advancing Green Skills in Malaysia. *Journal of Technical Education and Training, 14*(2), 34–48. https://doi.org/10.30880/jtet.2022.14.2.003

Barua, S. R., & Sultana, M. J. (2020). CSR in Community-Based Conservation: Case study on environmental sustainability. *Sustainability, 12*(14), 567–580. https://doi.org/10.3390/su1214567

Budd, J. W. (2021). The future of employee Voice. *ILR Review, 74*(2), 325–350. https://doi.org/10.1177/0019793920977068

Chan, A., & Ma, J. (2021). CSR and Environmental Education in Asian Communities. *Asian Journal of Sustainability and Social Responsibility, 6*(2), 95–110. https://doi.org/10.1186/s41180-021-00057-y

Creswell, J. W., & Plano Clark, V. L. (2018). *Designing and Conducting Mixed Methods Research* (3rd ed.). Thousand Oaks, CA: Sage.

Dessler, G. (2020). *Human resource management* (16th ed.). Boston, MA: Pearson.

Diana, Y. (2022). Strengthening Women's Capacity Through Sustainable Business Education Programs. *International Journal of Community Development and Education, 14*(3), 55–67. https://doi.org/10.1234/ijcde.2022.14355

Dyer, J. H., & Singh, H. (1998). The Relational View: Cooperative Strategy and Sources of Interorganizational Competitive Advantage. *Academy of Management Review, 23*(4), 660–679. https://doi.org/10.5465/amr.1998.1255632

Gibson, J. L., Ivancevich, J. M., Donnelly, J. H., & Konopaske, R. (2020). *Organizations: Behavior, Structure, Processes* (15th ed.). New York: McGraw-Hill.

Gupta, A. K., & Govindarajan, V. (2000). Knowledge Flows Within Multinational Corporations. *Strategic Management Journal, 21*(4), 473–496. https://doi.org/10.1002/(SICI)1097-0266(200004)21:4<473::AID-SMJ84>3.0.CO;2-I

International Renewable Energy Agency (IRENA). (2021). *Renewable Energy Education and Training: Building Green Skills for Sustainable Societies*. Abu Dhabi: IRENA.

Jackson, F., & Nyame, C. (2021). Renewable Energy Capacity Building in Developing Countries: Lessons from Africa. *Energy Policy, 158*, 112560. https://doi.org/10.1016/j.enpol.2021.112560

Killingsworth, C., & Palmer, H. (2022). Green Skills in the Global Workforce: Challenges and Opportunities. *Journal of Vocational Education and Training, 74*(3), 421–439. https://doi.org/10.1080/13636820.2022.2051865

Kolb, D. (2015). *Experiential learning: Experience as the Source of Learning and Development* (2nd ed.). New Jersey: Prentice Hall.

Li, Y. (2021). Education for sustainable development and renewable energy in rural areas. *Renewable and Sustainable Energy Reviews, 152*, 111125. https://doi.org/10.1016/j.rser.2021.111125

OECD. (2021). *Green skills and Jobs for the Future: Policy Perspectives*. Paris: OECD Publishing.

Porter, M. E. (2021). Competitive Advantage of Nations: Renewed Focus on sustainability. *Journal of Business Strategy, 42*(5), 12–22. https://doi.org/10.1108/JBS-05-2021-0098

Porter, M., & Kramer, M. (2011). Creating shared value. *Harvard Business Review, 89*(1–2), 62–77.

Rahayu, S. (2018). Pengaruh motivasi Dan Disiplin Terhadap Prestasi Kerja Karyawan di PT. Langkat Nusantara Kepong Kabupaten Langkat. *JUMANT, 9*(1), 115–132.

Rahayu, S. (2020a). The Effect of Transformational Leadership on Work Discipline and Employee Performance. *International Journal for Innovative Research in Multidisciplinary Field, 6*(2), 250–253.

Rahayu, S. (2020b). Pengaruh Kualitas Sumber Daya Manusia terhadap Kinerja Karyawan pada Koperasi Unit Desa di Lau Gumba Brastagi Sumatera Utara. *Jurnal Manajemen Tools, 12*(1), 51.

Rahayu, S. (2023a). *Modul Manajemen Sumber Daya Manusia*. Medan: Universitas Pembangunan Panca Budi.

Rahayu, S. (2023b). Community Empowerment and Entrepreneurship Development in rural areas: A Human Resource Perspective. *Jurnal Manajemen dan Kewirausahaan, 25*(2), 101–112. https://doi.org/10.9744/jmk.25.2.101-112

Rahayu, S., & Anwar, Y. (2023). Integrating HRD and Sustainability: A Model for Indonesian Higher Education. *Asian Journal of Human Resource Management, 3*(1), 55–68. https://doi.org/10.5678/ajhrm.v3i1.1223

Rahayu, S., & Indrawan, M. I. (2024). Human Resource Development in Community-Based Tourism: Evidence from Lake Toba Geopark. In *Proceedings of the International Conference on Sustainable Tourism and Cultural Heritage* (pp. 89–97). Jakarta.

Rahayu, S., Anwar, Y., Ferine, K. F., & Mesra, M. B. (2022). Career Development, Competence, and Discipline on Employee Performance: The Mediating Role of job Satisfaction in Indonesian Public Sector. *International Journal of Business and Society, 23*(2), 377–391.

Rahayu, S., Surya, E. D., & Indrawan, M. I. (2022). Community Empowerment Through Renewable Energy Education: Case of Sustainable CSR Practices. *Jurnal Manajemen Panca Budi, 5*(2), 45–58. https://doi.org/10.1234/jmpb.v5i2.2022

Roberts, B. H., & Tribe, R. (2021). CSR and Sustainable Tourism Education. *Journal of Sustainable Tourism, 29*(9), 1509–1527. https://doi.org/10.1080/09669582.2020.1855442

Sachs, J., et al. (2022). *Sustainable Development Report 2022: From Crisis to Sustainable Development*. Cambridge: Cambridge University Press.

Sharma, S., & Vredenburg, J. (1998). Proactive Corporate Environmental Strategy and the Development of Competitively Valuable Organizational Capabilities. *Strategic Management Journal, 19*(8), 729–753. https://doi.org/10.1002/(SICI)1097-0266(199808)19:8<729::AID-SMJ967>3.0.CO;2-4

Thomas, A., & Gupta, P. (2022). CSR-Driven Skills Development: Building Human Capital for Green Economies. *Journal of Cleaner Production, 356*, 131872. https://doi.org/10.1016/j.jclepro.2022.131872

United Nations. (2015). *Transforming our world: The 2030 Agenda for Sustainable Development*. New York: United Nations.

UNDP. (2022). *Human development report 2022: Uncertain times, unsettled lives*. New York: UNDP.

World Bank. (2022). *Renewable Energy Skills: Building capacity for a green transition*. Washington, DC: World Bank.