Journal of Renewable Engineering
E-ISSN : 3046-7624
https://nawalaeducation.com/index.php/JORE/index
Vol.2.No. 1 February 2025
DOI : https://doi.org/10.62872/17a64y42

Simple Decision Making in Renewable Energy Planning

Rahmad Surya Hadi Saputra[1], Dr.Sulaiman A.ST.M.Si[2], Usman Tahir[3], Loso Judijanto[4]
Politeknik Kelautan dan Perikanan Karawang, Indonesia[1], Politeknik Negeri Kupang, Indonesia[2], University of Sains and Technology Jayapura, Indonesia [3], IPPOS Jakarta, Indonesia[4]

Email : rahmad2002@gmail.com

Received: December 31, 2024
Revised : January 10, 2025
Accepted: Feberuary 15, 2025
Published: Februari 27, 2025

ABSTRACT

Renewable energy planning is a complex process, involving multiple dimensions, including natural resource availability, government policies, and socio-economic factors. This study emphasizes the importance of a decision-making approach that is not only technically based, but also considers the social and political factors that influence policy implementation. Decision-making in renewable energy planning is often hampered by information inequality between stakeholders, social resistance, and policy instability that can slow down a sustainable energy transition. Multi-Criteria Decision Making (MCDM) methods have been used to help stakeholders choose the best option, but overly technical approaches can be a barrier in developing countries. Therefore, simpler and more data-driven approaches, such as heuristic models, become more relevant in contexts of uncertainty. This research uses a descriptive qualitative approach through case studies to explore the dynamics of decision-making in renewable energy planning. Data were collected through in-depth interviews, focus group discussions (FGDs), and document analysis. The results show that transparency, open communication and stakeholder participation are essential to overcome social and political barriers and support effective and sustainable renewable energy policy implementation.

Keywords: Renewable Energy Planning; Multi-Criteria Decision Making; Stakeholder Participation

INTRODUCTION

Renewable energy planning is a complex process that involves multiple dimensions, including natural resource availability, government policies, market conditions and environmental factors. One of the main challenges in this process is how policy makers can balance economic and sustainability aspects simultaneously. Studies show that decision-making in energy planning is often affected by market uncertainty and dynamic regulatory changes (Xie et.al., 2024). In addition, the diversity of renewable energy sources, such as solar, wind and biomass, requires in-depth analysis of geographical factors and supporting infrastructure. In this context, a simple but data-driven approach is needed so that policies are not only technocratic, but also practically implementable and adaptive to changing external conditions.

Given this complexity, experts emphasize the importance of decision-making methods that not only consider technical aspects, but also take into account social and economic perspectives (Dewantara, 2023). For example, Multi-Criteria Decision Making (MCDM) methods have been widely used to assist stakeholders in selecting the best option in energy planning (Kumar et al., 2017). However, overly technical approaches can make policy adoption difficult, especially in developing countries with limited resources

and institutional capacity. Therefore, simpler decision-making models are needed, but still based on the principles of sustainability and efficiency. Thus, renewable energy planning is not only a technical solution, but also able to answer broader social and economic challenges.

In the context of renewable energy planning, overly complex decision-making approaches are often a barrier to effective policy implementation, especially in countries with limited technical capacity and resources (Alizadeh et al., 2020). Data-driven models such as mathematical optimization and artificial intelligence-based simulations can provide more accurate analysis, but limitations in access to quality data, technological infrastructure, and the ability to interpret analysis results are often a major obstacle (Selvarajan, 2021). Therefore, simpler approaches, such as heuristic methods or empirical experience-based decision-making, become more relevant in certain contexts. Although these methods have limitations in prediction accuracy, their flexibility and ease of implementation can improve the effectiveness of renewable energy policies, especially in situations where decision-making must be done quickly and under conditions of high uncertainty.

Furthermore, the success of a simple approach to renewable energy planning relies heavily on the involvement of a wider range of stakeholders, including local communities, the private sector, and local governments (Sekaringtias et al., 2023). Instead of relying solely on quantitative-based models, more intuitive participatory approaches can increase community acceptance of proposed policies. For example, the Delphi method or discussion-based scenario analysis can help formulate energy strategies that are not only technically efficient but also fit the social and economic needs of local communities (Schmalz et al., 2021). Thus, a simple approach to decision-making is not just a technical simplification, but also a strategy to increase inclusiveness, transparency and policy effectiveness in supporting a sustainable energy transition.

In the decision-making process related to renewable energy planning, non-quantitative factors such as social and political aspects often have a greater influence than technical analysis alone. Studies show that local community support and government policy stability are decisive factors in the successful implementation of renewable energy (Farid, 2024). Wind energy projects in several European countries have experienced obstacles not because of technological or cost limitations, but because of social resistance arising from the lack of community involvement in the planning process (Qoiriyah et al., 2024). Policy uncertainty is also a major challenge, where inconsistent regulatory changes can hinder long-term investment in the sustainable energy sector. Descriptive qualitative methods are therefore a relevant tool to understand how social and policy dynamics influence decision-making processes in renewable energy planning.

Furthermore, transparency in energy policy formulation and active participation of various stakeholders can increase the legitimacy and effectiveness of renewable energy implementation (Jochemsen et al., 2024). Deliberative approaches, such as multi-stakeholder discussions and public consultations, allow decision-makers to accommodate multiple perspectives, resulting in more inclusive and sustainable policies. For example, participatory approaches to solar energy planning in some developing regions have been shown to increase technology adoption and reduce social conflicts that often arise from a lack of communication between government and communities (Nainggolan et al., 2023). Thus, understanding the non-quantitative factors in decision-making not only helps in more comprehensive planning, but also ensures that the renewable energy transition can be more effective with broad support from various parties.

With the growing need for renewable energy and the energy transition becoming more urgent, streamlining the energy planning process is a must. A key challenge is how to formulate policies that are acceptable to a wide range of stakeholders, including governments, the private sector and communities. Many planning strategies are too complex and take a long time to execute, which can hinder effective implementation of renewable energy policies (Chipangamate & Nwaili, 2024). Therefore, it is imperative to identify simpler approaches that are still capable of producing informative and accountable decisions. This research emphasizes the need for more practical decision-making approaches, such as heuristic-based models or simple multi-criteria decision methods that can be accepted by different levels of society without compromising the quality of the decision outcome (Rani et al., 2024). This simplification will facilitate communication between stakeholders and accelerate the implementation of renewable energy policies.

Furthermore, in the face of ambitious energy transition challenges, the timeliness of decision-making is critical. Overly lengthy planning processes can hinder rapid responses to market dynamics and developments in renewable energy technologies. Studies show that streamlining decision-making processes, especially by introducing more transparent and inclusive techniques, can accelerate policy implementation and increase the adoption rate of renewable energy at both local and national levels (Ogunyemi & Ishola, 2024). In this context, participatory methods involving multiple parties can help accelerate consensus and reduce uncertainty, which in turn supports achieving the goal of a faster energy transition. Simpler and faster processes will enable renewable energy policies to be more responsive to the challenges faced and ensure that the energy transition is more effective and sustainable.

METHOD

In this research, the qualitative approach used is a case study with a descriptive approach, which aims to explore in depth the decision-making process in renewable energy planning. This research will explore how various stakeholders, such as the government, private sector and communities, consider social, economic and technical factors in formulating renewable energy policies. This case study allows the researcher to understand the dynamics between the various parties involved in the decision-making process, as well as the challenges posed by the uncertainties, social constraints and political pressures that influence the outcome of these decisions. With this approach, the research is expected to present a more comprehensive picture of the factors that influence decision-making in the context of a sustainable energy transition.

The main data collection methods used in this research are in-depth interviews and focus group discussions (FGDs). In-depth interviews will be conducted with policy makers, energy planners, and communities involved in the planning process to understand their perspectives on the factors that influence decisions. In addition, FGDs will be used to dig deeper into the views of various stakeholders on renewable energy policies, providing space for discussions that can enrich the research results with various perspectives. Document analysis will also be conducted to explore how renewable energy policies are reflected in existing practices and regulations. The data analysis process will be carried out using thematic analysis, which aims to identify the main themes that emerge from the interviews and FGDs, and compare the results obtained from the various cases studied. By combining these various techniques, this research will be able to provide a deeper understanding of the decision-making process in renewable energy planning.

RESULT AND DISCUSSION

Social and Political Dynamics in Renewable Energy Decision-Making

1. Social Resistance to Renewable Energy Projects

Social resistance to renewable energy projects, such as wind or solar power plants, often arises among the communities directly affected by the project. One of the main reasons for this rejection is the lack of clear understanding and information regarding the benefits of renewable energy. Many people living in directly affected areas do not get enough information about how this project can improve their quality of life in the long term. For example, people may worry that the construction of wind farms will damage the environment or interfere with their economic activities, such as agriculture or tourism. The lack of effective communication between project developers and the local community often leads to mistrust and anxiety about the upcoming changes. In addition, the policies implemented often do not take into account local socio-economic needs or conditions, so that people feel that these policies are more beneficial to outsiders, not them. An interview with a village chief in the area affected by the solar energy project revealed that

> "*We were never involved in the initial planning, so we don't know how this project will help us or if it will hurt our livelihoods.*"

This reflects the uncertainty felt by communities who do not feel they have control over the changes that are taking place in their area.

Community involvement in the planning and decision-making stages can be one solution to reduce resistance to renewable energy projects. When communities are given the opportunity to participate in discussions about project planning, they are more likely to accept the project because they feel valued and involved in decisions that affect their lives. This participation allows them to express their concerns and obtain clearer information about the benefits of renewable energy. Through consultation forums or deliberations, for example, communities can have direct dialogue with project developers and get explanations about long-term positive impacts, such as the creation of new jobs or reduced dependence on fossil energy. Research conducted by Apriliyanti & Rizki (2023) on community acceptance of renewable energy shows that more intensive local involvement in the planning stage can increase acceptance and reduce social conflict. This active participation helps to foster a sense of ownership of the project and gives communities the space to ask questions and provide relevant input.

Scientifically, participatory approaches in renewable energy planning are also supported by theories of social communication and public participation. According to Liu et al (2020) in their public participation model, the greater the level of public participation in decision-making, the higher the level of acceptance of the policies implemented. This theory explains that effective participation can strengthen policy legitimacy and reduce distrust that may arise from a lack of transparency or engagement. In addition, research by Radtke & Renn (2024) shows that resistance to renewable energy is more common in areas that are not involved in the planning process, while areas that have high involvement in policy decisions tend to be more accepting of the project, as people feel that the policy is tailored to their local needs and conditions. An approach that integrates local values and listens to the aspirations of the community, as is done in some

renewable energy projects that involve the active participation of the community in decision-making, has proven to create more adaptive and relevant policies. Thus, reducing resistance to renewable energy depends not only on providing information, but also on actively involving communities in planning and decision-making processes that are more inclusive and based on local needs.

2. Information Inequality and Mistrust between Stakeholders

Information inequality between stakeholders in renewable energy planning has become an important issue affecting the effectiveness of decision-making. Governments often have data on policies, regulations, and incentives related to renewable energy, but technical information on the potential, efficiency, and challenges of technology is often unavailable or hidden. The private sector, which is more focused on technology development, has more in-depth technical knowledge but is often reluctant to share this information openly, especially when it comes to business strategy or competitive advantage. Communities, as the parties most affected by energy policy, often do not have adequate access or understanding of the benefits or long-term impacts of renewable energy. This leads to information inequalities that exacerbate mistrust between the parties involved, making it difficult to achieve effective and sustainable policies. For example, in an interview with one of the members of the private sector involved in the development of renewable energy, he stated,

> *"We often feel that the government does not adequately understand the technical challenges we face in implementing renewable energy projects, and at the same time, the public is not adequately informed about the potential benefits they can feel."*

Mistrust arising from information inequality can create obstacles to effective decision-making. If governments and the private sector feel distrustful of each other, decisions are likely to be more cautious and conservative, hindering the innovation needed to address renewable energy challenges. Mistrust between the community and other stakeholders can also lead to resistance to renewable energy projects, especially if the community feels excluded from the planning process. In this context, distrust hinders the achievement of common goals in the development of renewable energy, as each stakeholder operates in an information silo that does not share or understand each other. To address such information inequalities and mistrust, a more open, inclusive and transparent approach is needed. Better communication between stakeholders can reduce mistrust and build stronger trust. For example, opening communication channels to share clearer data and information and involving communities in decision-making processes can increase understanding and support for renewable energy projects. In addition, education and outreach programs based on easy-to-understand data will help communities to better understand the long-term benefits of renewable energy, while reducing any mistrust that may arise. With this inclusive approach, stakeholders can jointly formulate more effective policies that support the sustainability of renewable energy in the future.

3. The Effect of Political Instability on Renewable Energy Policy

Political instability is often a major obstacle to the implementation of renewable energy policies, which in turn can hinder the transition to more sustainable energy. Frequent changes in government lead to uncertainty in regulation, which is detrimental to the renewable energy sector. For example, in the United States, President Trump's

administration reduced support for clean energy policies by repealing environmental policies that support renewable energy, such as withdrawing from the Paris Agreement and ending renewable energy subsidies. Instead, President Biden's administration reintroduced policies that support renewable energy through a large stimulus package for clean energy technologies and efforts to strengthen renewable energy infrastructure. Something similar happened in Brazil, where a change of government also led to a drastic change in energy policy. In an interview with DC, an energy policy expert, he affirmed,

> *"Political instability makes renewable energy policies unpredictable, so investors are reluctant to invest in long-term projects that require regulatory stability."*

This uncertainty has a direct impact on investment interest in the renewable energy sector, which relies heavily on consistent government policies to attract the required large capital.

In addition to the impact of changing governments, political instability can also lead to inconsistent regulatory changes, worsening conditions for the renewable energy sector. Changing regulations, whether in terms of taxes, subsidies or energy tariffs, provide confusing signals to industry players and investors. This hampers long-term efforts to develop renewable energy projects, which require policy certainty and sustainability. For example, countries with political instability often have difficulty maintaining long-term incentives for renewable energy, as seen in Indonesia's policy uncertainty that can change national energy priorities depending on the government in power. According to a study by Hille (2023), countries with political instability tend to experience decreased investment in the renewable energy sector compared to countries with more stable policies. The study revealed that inconsistent regulations can lower the attractiveness of the renewable energy sector, which relies on legal certainty to attract the necessary investment in the development of new technologies.

To overcome the impact of political instability, it is important for countries to formulate policies that are flexible yet consistent in the long term. Policies based on widely accepted universal goals, such as reducing carbon emissions and dependence on fossil energy, are more likely to survive changes in government. One approach is to involve various stakeholders, including civil society, industry and academia, in formulating renewable energy policies. Broader public participation can strengthen policy legitimacy and encourage public support for a sustainable energy transition. A study by Kusnadi et al (2022) shows that public participation in the policy-making process can increase the stability of energy policies, as policies that involve many parties tend to be more easily accepted and maintained. In addition, public education and awareness campaigns on the benefits of renewable energy can create broader support, which in turn reduces the influence of political change on the policy.

Simple Decision-Making Methods in Renewable Energy Planning

1. The Use of Heuristic Models in Renewable Energy Decision-Making

The use of heuristic models in decision-making related to renewable energy is increasingly receiving attention in the literature related to the efficiency of sustainable energy resource management. Heuristics, which rely on rules of thumb and intuition, allow decision-makers to formulate choices quickly even when faced with highly complex and uncertain situations. In the renewable energy sector, where various variables such as geographical conditions, technology prices, government policies, and social and

economic factors must be considered, fast and efficient decision-making is critical. For example, in an interview with a renewable energy analyst, he stated,

> *"Decisions often have to be made in a short period of time, and the heuristic model helps us to make more practical, albeit not always thorough, choices."*

This shows how heuristics play a role in accelerating the decision-making process without the need to involve in-depth analysis of each existing element.

However, while the use of heuristics can reduce uncertainty and aid in faster decision-making, it cannot be denied that there are potential risks in the resulting decisions. Heuristic models tend to rely on experience and intuition, which in some cases can lead to errors or suboptimal decisions. Previous research by Bojke et al (2021) showed that although heuristics ease the cognitive process, rushed decision-making can lead to certain biases, such as confirmation bias or status quo bias. In the context of renewable energy, this can be risky if decision-makers are too quick to choose familiar technologies or rely too much on incomplete data. Nonetheless, heuristics can still be effective in providing reasonably good solutions if applied carefully and supplemented by continuous monitoring.

From a sustainability perspective, while heuristic-based decisions may not always be optimal, this approach remains relevant in highly dynamic environments such as the renewable energy sector. Fast and flexible decision-making is often required to respond to changing market conditions or rapidly evolving technologies. However, to ensure its sustainability, it is important for decision-makers to actively evaluate the results and update the approach used. For example, in a study conducted by Methling et al (2022) on decision-making, they emphasized that decisions made through heuristics should be continuously tested and adjusted to the latest developments to remain effective and relevant. With proper monitoring and evaluation, heuristics-based decisions can adapt to changes in renewable energy technologies and markets, and create more sustainable solutions in the long run.

2. A Multi-Criteria Approach in Assessing Renewable Energy Policies

The Multi-Criteria Approach to Assessing Renewable Energy Policy (MCDM) offers an effective solution to complex decision-making processes, involving a variety of often conflicting factors, such as cost, sustainability, and social impact. In the renewable energy sector, optimal decision-making requires a thorough evaluation of various technology options, such as solar, wind, and biomass. MCDM allows decision-makers to take into account diverse criteria, such as procurement and operational costs, environmental impact, potential emission reductions, and its social impact on society. This process can also include an assessment of the security of long-term energy supply. The main advantage of this approach is its ability to integrate multiple perspectives in a single decision, produce more balanced policies, and consider the diverse interests of the stakeholders involved. For example, in an interview with an energy policy expert, he stated,

> *"The MCDM method provides clear guidance in choosing between different renewable energy sources by considering technical and social criteria simultaneously, which are often difficult to separate."*

In the context of renewable energy decision-making, MCDM allows for greater transparency and participation from the stakeholders involved. Each party, such as the

government, society, and the private sector, has different interests that need to be accommodated in the policies taken. This process leads to more inclusive decision-making, by providing an opportunity for each stakeholder to assign value or weight to the criteria they consider important. Along with that, increasing transparency is one of the positive results of the implementation of MCDM, because every decision taken can be accounted for based on the weight and priorities that have been mutually agreed. This will reduce the likelihood of conflicts of interest and increase the acceptability of the resulting policies. A study by Cinelli et al (2022) in Multiple Criteria Decision Analysis revealed that this method not only provides a stronger basis for decision-making, but also helps align different goals from various stakeholders.

Despite having many advantages, the implementation of MCDM in renewable energy policy is not free from challenges. One of the main obstacles is subjectivity in determining the weights for each criterion, which has the potential to lead to suboptimal results. In a study conducted by Putri (2022) regarding the Analytic Hierarchy Process (AHP), one of the methods in MCDM, it was stated that accuracy in determining weight is very important to ensure accuracy in decision-making. In addition, the diversity of interests between different stakeholders, as well as difficulties in assessing criteria that are not easily quantitatively measured (such as social impact and sustainability), can be obstacles in the implementation of MCDM. However, with a systematic approach and the right selection of methods, MCDM can help accelerate the implementation of renewable energy policies without sacrificing the quality of decisions. This approach allows for more efficient and data-driven decision-making, as well as reduces uncertainty in future energy planning.

3. The Role of Stakeholder Participation in Simplifying the Decision Process

The role of stakeholder participation in simplifying the decision-making process is crucial, especially in the context of renewable energy planning. The involvement of various parties, such as the community, the private sector, and the government, can create more inclusive and sustainable decisions. By involving the community, for example, the potential for conflicts arising from ambiguity or disagreement can be minimized, because the public consultation process provides space for the public to voice their concerns or views. Additionally, the involvement of a well-experienced private sector in renewable energy technology and investment can speed up the decision-making process, as they can offer more efficient and innovative solutions. The government as the main decision-maker plays a role in formulating policies that can unite these various interests, creating a balance between economic, social, and environmental needs. Through this inclusive process, consensus can be reached more quickly and solidly, which ultimately makes policy implementation easier.

In addition, the active participation of stakeholders can also increase public support for renewable energy policies. When people feel involved in the decision-making process, they are more likely to accept and support the policy. This is crucial in the transition to renewable energy, where significant changes in energy consumption patterns require broad support from different levels of society. In this process, transparency and open communication between stakeholders are indispensable to build trust and reduce the uncertainty that is often an obstacle to policy acceptance.

Methods that can be used to engage stakeholders include public consultations, which provide opportunities for the public to provide input on policies being designed, and multi-stakeholder dialogues that allow various parties to discuss directly on important issues. In addition, participatory planning that involves the community and the private sector from an early stage can ensure that the policies designed truly take into

account the needs and interests of all parties involved. Collaboration between the government and the private sector can also result in innovative technical and financial solutions in the implementation of renewable energy projects. Overall, stakeholder participation not only simplifies the decision-making process, but also creates policies that are more effective, sustainable, and well-tolerated by the community

CONCLUSION

Social and political dynamics influence decision-making in the development of renewable energy, which is often faced with social resistance and information inequality. Resistance to renewable energy projects arises due to a lack of public understanding of the long-term benefits and distrust of project developers. Community involvement in planning and decision-making can reduce this resistance, along with increased transparency and effective communication. Information inequality between stakeholders, such as governments, the private sector, and the public, also exacerbates existing mistrust. This mistrust hinders the collaboration needed to achieve effective and sustainable renewable energy policies. Inclusive and transparent approaches, such as more open communication and educational programs, can help address information inequalities. Political instability has also affected renewable energy policy, with changes in government often bringing regulatory uncertainty. Inconsistent government changes can hamper long-term investment and exacerbate challenges in renewable energy development. To address this, it is important for countries to formulate policies that are flexible but remain consistent, involving various stakeholders. The use of heuristic models in decision-making related to renewable energy can help generate quick but risky decisions, which require continuous monitoring. The Multi-Criteria Approach in Assessing Renewable Energy Policy (MCDM) offers a more comprehensive solution by considering various conflicting factors, resulting in a more balanced and sustainable policy.

REFERENCES

Alizadeh, R., Soltanisehat, L., Lund, P. D., & Zamanisabzi, H. (2020). Improving renewable energy policy planning and decision-making through a hybrid MCDM method. *Energy Policy*, *137*, 111174.

Apriliyanti, K., & Rizki, D. (2023). Kebijakan energi terbarukan: studi kasus indonesia dan norwegia dalam pengelolaan sumber energi berkelanjutan. *Jurnal Ilmu Pemerintahan Widya Praja*, *49*(2), 186-209.

Bojke, L., Soares, M., Claxton, K., Colson, A., Fox, A., Jackson, C., ... & Taylor, A. (2021). Reviewing the evidence: heuristics and biases. In *Developing a reference protocol for structured expert elicitation in health-care decision-making: a mixed-methods study*. NIHR Journals Library.

Chipangamate, N. S., & Nwaila, G. T. (2024). Assessment of challenges and strategies for driving energy transitions in emerging markets: A socio-technological systems perspective. *Energy Geoscience*, *5*(2), 100257.

Cinelli, M., Kadziński, M., Miebs, G., Gonzalez, M., & Słowiński, R. (2022). Recommending multiple criteria decision analysis methods with a new taxonomy-based decision support system. *European Journal of Operational Research*, *302*(2), 633-651.

Dewantara, R. (2023). *Metodologi Penelitian Sistem Berbasis Action Research: Teori dan Aplikasinya*. Universitas Brawijaya Press.

Farid Asyhadi, F. A. (2024). *Implementasi Kebijakan Pemanfaatan Potensi Energi Baru Terbarukan Di Provisi Sulawesi Barat* (Doctoral dissertation, Politeknik STIA LAN Makassar).

Hille, E. (2023). Europe's energy crisis: Are geopolitical risks in source countries of fossil fuels accelerating the transition to renewable energy?. *Energy Economics*, *127*, 107061.

Jochemsen, N., Mees, H., & Akerboom, S. (2024). Renewable energy communities: Democratically legitimate agents in governing the energy transition?. *Energy Research & Social Science*, *117*, 103732.

Kumar, A., Sah, B., Singh, A. R., Deng, Y., He, X., Kumar, P., & Bansal, R. C. (2017). A review of multi criteria decision making (MCDM) towards sustainable renewable energy development. *Renewable and sustainable energy reviews*, *69*, 596-609.

Kusnadi, N. A., Aprilya, J. A., Dea, A. P. A., Durrotunnisa, D., & Dinsaty, R. (2022, August). Transisi Energi: Kerjasama Indonesia-IEA (International Energy Agency) Terhadap Perkembangan Energi Terbarukan. In *Proceeding Technology of Renewable Energy and Development Conference* (Vol. 2).

Liu, L., Bouman, T., Perlaviciute, G., & Steg, L. (2020). Public participation in decision making, perceived procedural fairness and public acceptability of renewable energy projects. *Energy and Climate Change*, *1*, 100013.

Methling, F., Abdeen, S. J., & von Nitzsch, R. (2022). Heuristics in multi-criteria decision-making: the cost of fast and frugal decisions. *EURO Journal on Decision Processes*, *10*, 100013.

Nainggolan, H., Nuraini, R., Sepriano, S., Aryasa, I. W. T., Meilin, A., Adhicandra, I., ... & Prayitno, H. (2023). *GREEN TECHNOLOGY INNOVATION: Transformasi Teknologi Ramah Lingkungan berbagai Sektor*. PT. Sonpedia Publishing Indonesia.

Ogunyemi, F. M., & Ishola, A. O. (2024). Encouraging investment in renewable energy through data-driven analytics and financial solutions for SMEs. *Renewable Energy Economics Journal*.

Putri, E. O. (2022). *Perancangan Dan Implementasi Sistem Pendukung Keputusan Pemilihan Vendor Berbasis Web Pada Perusahaan Menggunakan Metode F-ANP* (Doctoral dissertation, Institut Teknologi Sepuluh Nopember).

Qoiriyah, M., Pramesti, S. C., & Wulandari, F. (2024, October). Green Economy: Solusi Inklusif untuk Tantangan Lingkungan dan Sosial. In *Prosiding Seminar NasIonal Pembangunan Ekonomi Berkelanjutan dan Riset Ilmu Sosial* (Vol. 1, No. 1, pp. 47-56).

Radtke, J., & Renn, O. (2024). Participation in energy transitions: a comparison of policy styles. *Energy Research & Social Science*, *118*, 103743.

Rani, A., Mishra, D., & Omerovic, A. (2024). Multi-criteria decision-making methods: a case of software vendor selection. *TEM Journal*, *13*(2), 1218.

Schmalz, U., Spinler, S., & Ringbeck, J. (2021). Lessons learned from a two-round Delphi-based scenario study. *MethodsX*, *8*, 101179.

Sekaringtias, A., Verrier, B., & Cronin, J. (2023). Untangling the socio-political knots: A systems view on Indonesia's inclusive energy transitions. *Energy Research & Social Science*, *95*, 102911.

Selvarajan, G. (2021). Leveraging AI-Enhanced Analytics for Industry-Specific Optimization: A Strategic Approach to Transforming Data-Driven Decision-Making. *International Journal of Enhanced Research In Science Technology & Engineering*, *10*, 78-84.

Xie, Z., Ali, H., Kumar, S., Naz, S., & Ahmed, U. (2024). The Impact of Energy-Related Uncertainty on Corporate Investment Decisions in China. *Energies*, *17*(10), 2368.