International Journal of Current Science Research and Review
ISSN: 2581-8341
Volume 07 Issue 02 February 2024
DOI: 10.47191/ijcsrr/V7-i2-36, Impact Factor: 7.943
IJCSRR @ 2024
www.ijcsrr.org

The Significance of Stakeholders in the Rooftop Solar Power Plant Ecosystem Industry in Indonesia

Muhammad Farhan Chairahman[1], Astri Ghina[2], Muhammad Awaluddin[3]
[1] Magister Student of Management Program, Faculty of Economics and Business, Telkom University, Bandung, 40257, Indonesia
[2,3] Telkom University, Faculty of Economics and Business, Bandung, 40257, Indonesia

ABSTRACT: Stakeholder analysis in an ecosystem is important for managers to planning the most efficient strategic steps for their organization. On the other hand, there is lack of research that mapping the significance of actors inside the ecosystem of an industry. This study attempts to utilize the network analysis as a method to examine the significance of stakeholders. We demonstrate the usage and effectiveness of this method in the rooftop solar power plant ecosystem industry in Indonesia. This study used a qualitative research methodology. Data were obtained through in-depth interviews with stakeholders who formed the industry. The result of this study are Indonesia's rooftop solar power plant ecosystem map and power-interest grid of the stakeholders.

KEYWORDS: Ecosystem map, Network analysis, Management strategy, Stakeholder analysis.

INTRODUCTION

Stakeholder analysis is an approach to identifying and explaining stakeholders based on their attributes, relationships, and importance related to the problem. This is used to understand the system by identifying the main actors and stakeholders in a project and measuring their interest in it (Chinyio & Olomolaiye, 2010; Grimble & Wellard, 1997). Various stakeholder analysis methods in previous studies considered stakeholder identification, classification, and assessment (Mok et al., 2015). An analysis based on social network theory can provide insights into the stakeholder's environment by examining the structural attributes of stakeholder networks and interactions between stakeholders (Mok et al., 2015; Rowley, 1997). Social network analysis has been used as a tool for stakeholder analysis throughout the past decade. Social network analysis is used to examine social relations that are structured by actors because it is grounded in the assumption that the relationships between interacting entities hold significance (Wasserman & Faust, 1994). This method is appropriate for this research as the relationship components of comprehending a complex system such industrial level ecosystem. Stakeholders' structural patterns and needs can be extracted and analyzed by social network analysis. Identifying the relevant stakeholders is crucial in order to recognize their vested interests and influences, as well as to comprehend the dynamics of their network.

The context of the research in this study is an industry in Indonesia. The rooftop solar power plant construction industry is growing simultaneously with the government's energy mix target and net zero emission target (Kementerian Perindustrian, 2021). Even though the amount of solar power plant capacity in Indonesia continues to increase every year, there is a huge gap between the national target, which is 900 MWp, with the realization of installation capacity by 79.02 MWp in 2020 (Nurfajri et al., 2023). The institute for Essential Service Reform reported that one of the reasons this gap exist is due to a lack of interest in solar power plant systems (Institute for Essential Service Reform, 2019, 2021). From a business point of view, the solar power plant industry is not as attractive as another energy source. The challenges in financing renewable energy projects include substantial capital requirements, a scarcity of financial products tailored to the specific needs of such projects, unappealing project scales, and a lack of interest from local financial institutions. Also, return on investment (RoI) value of a renewable energy project is low (Ery et al., 2020; Renewable Energy Agency, 2020). This industry's sustainability is fragile due to its dependence on regulations issued by the government, which have impacts on stakeholders in the industry (Antara, 2022). Multiple stakeholders within the system indicate that each stakeholder contribute their portion to the problem and the system. This study propose an analysis of who are stakeholders that contruct the ecosytem of rooftop solar power plant industry in Indonesia and who are the influential and powerful ones in the ecosystem.

International Journal of Current Science Research and Review
ISSN: 2581-8341
Volume 07 Issue 02 February 2024
DOI: 10.47191/ijcsrr/V7-i2-36, Impact Factor: 7.943
IJCSRR @ 2024
www.ijcsrr.org

MATERIALS AND METHODS

A. Data Collection

We designed a methodology for identifying the stakeholder of the rooftop solar power plant construction industry in Indonesia. Additionally, we aim to understand their relation by explore their needs in the ecosystem. We began the process by gathering data to elicit stakeholder needs. The researcher used a case study methodology in this study. The decision was made to explore real-life, contemporary bounded systems through detailed, in-depth data collection from various sources of information. The findings were then reported through case descriptions and thematic analysis (Creswell & Poth, 2018). This study used purposive sampling. We collected interviews with six different stakeholders that construct the ecosystem of industry, such as contractors, government agencies, financiers, local governments, interest groups, and manufacturers or suppliers (Baek & Bhamra, 2022). The interviewees for this study are equivalent stakeholders mentioned before in the rooftop solar power plant construction industry in Indonesia.

This data was acquired through structured in-depth interviews. After the interviews and preliminary data analysis, preliminary codes and categories were derived, which were subsequently condensed into distinct themes (Creswell & Poth, 2018). The interview questions were categorized into four sections: basic information and role of stakeholders; value preposition; market performance; partners and competitors; stakeholder's business model (for contractor, bank, and manufacturer or supplier) or regulations and policy direction (for government agencies and local governments); their particular needs for participating in the system; and their assessment of the existing condition of the system. The interviews duration were about 30 to 60 minutes.

Validation of qualitative research is necessary to address potential threats, including inconsistencies in statements, inaccuracies in data, and generalizations of findings. Hence, this study uses a triangulation technique to minimize this issue. Data source triangulation was conducted through different sources of informants and spending an extended period of time in the field. This was done in order to gain a more comprehensive understanding of the phenomenon being studied and to ensure that enough data was collected to reach a point of saturation (Creswell, 2014). This research used the data source triangulation technique, where each data source checked the statements of other sources. This method will determine the accuracy of the research results.

B. Data Analysis

This study uses qualitative data analysis with the Miles and Huberman model, which involves tasks such as reducing, displaying, and verifying data and drawing conclusions (Sugiyono, 2014). For this research, we performed an analysis of the data content to determine stakeholder needs from the interview's documentation, such as transcripts. Subsequently, we categorize the source and destination for each stakeholder need for the purpose of making a sociograph map.

Social network analysis was used to investigate correlation among stakeholders based on their needs. We use degree centrality to measure the value of the needs. Degree centrality refers to the total number of connections that a stakeholder has in a network. On the other hand, normalized degree (nDegree) centrality is calculated by dividing the degree of a stakeholder by the maximum feasible degree. This attribute is used to identify which node has the greatest influence in a network (Farooq et al., 2018).

The last step in data analysis, according to the Miles and Huberman model, is drawing conclusions and verifying them. If the conclusions are supported by valid and consistent evidence from each piece of data or by comparing the findings with the previous studies, then the conclusions put forward can be trusted.

RESULTS

A. Stakeholders Forming the Industry

We identified other stakeholders who construct the ecosystem of the rooftop solar power plant construction industry in Indonesia apart from the initial stakeholders. These names were generated through interviews with sources without measuring the attributes of each stakeholder. All the stakeholders that form the ecosystem of the rooftop solar power plant construction industry in Indonesia are contractor, government agency (Ministry of Energy and Mineral Resources (ESDM)), financier/bank, local government (Province Energy and Mineral Resources), interest group/NGO, vendor/local supplier, developer, end user/building owner customer, local manufacturer, international manufacturer, holder of electricity business supply area (Wilus), government agency (Ministry of Industry), and government agency (Ministry of Finance).

A visual representation of the needs of stakeholder that spread throughout the network's value is called a stakeholder need network. The network visualized can be seen in Figure 1. This network contains 13 stakeholders who construct the ecosystem of industry. Of these stakeholders, it is necessary to analyze who the most influential actors are in the ecosystem.

International Journal of Current Science Research and Review
ISSN: 2581-8341
Volume 07 Issue 02 February 2024
DOI: 10.47191/ijcsrr/V7-i2-36, Impact Factor: 7.943
IJCSRR @ 2024
www.ijcsrr.org

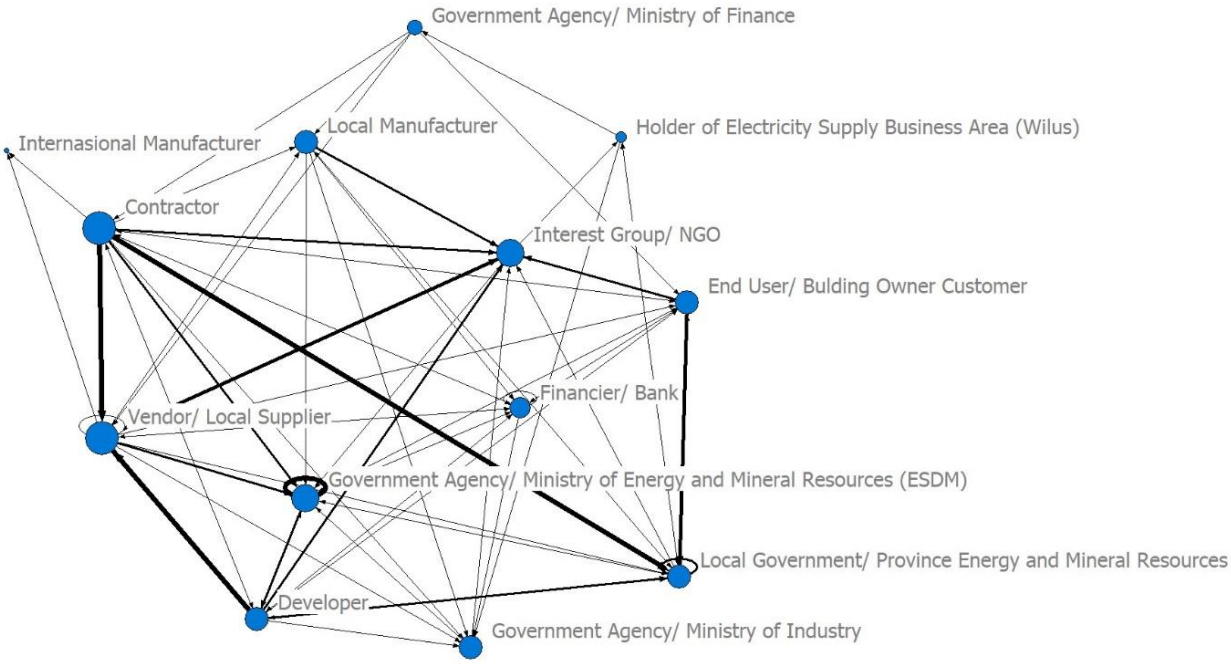

Figure 1. Stakeholder needs network's visualization in the rooftop solar power plant construction industry in Indonesia.

B. Significance of Stakeholders in the Industry

The identified stakeholders are measured their importance by the value of degree centrality. The level of stakeholder influence can be seen from the value of degree centrality in the social network. The higher inDegree value of a stakeholder indicates the higher need of other stakeholders for that stakeholder. The higher outDegree value of a stakeholder indicates the high dependence of that stakeholder on other stakeholders. Table 1 below presents a concise overview of the degree of centrality that has been normalized in the stakeholder's need network.

Table 1. Stakeholders' degree of centrality in the ecosystem of the rooftop solar power plant construction industry in Indonesia

Stakeholder	***Total***	
	nOutDegree	*nInDegree*
Contractor	1.417	0.250
Government agency/Ministry of Energy and Mineral Resources (ESDM)	0.667	1.167
Financier/Bank	0.667	0.583
Local government/Province Energy and Mineral Resources	0.333	1.083
Interest group/NGO	0.334	0.917
Vendor/local supplier	1.000	0.666
Developer	0.834	0.500
End user/building owner customer	0.500	0.550

International Journal of Current Science Research and Review
ISSN: 2581-8341
Volume 07 Issue 02 February 2024
DOI: 10.47191/ijcsrr/V7-i2-36, Impact Factor: 7.943
IJCSRR @ 2024
www.ijcsrr.org

Local manufacturer	0.500	0.333
International manufacturer	0.000	0.167
Holder of electricity business supply area (Wilus)	0.249	0.166
Government agency/Ministry of Industry	0.083	0.500
Government agency Ministry of Finance	0.417	0.083

It was found that the stakeholder most dependent on other stakeholders was the contractor, with a degree centrality value of 1.417. On the other hand, the central government/Ministry of Energy and Mineral Resources (ESDM), with a degree centrality value of 1.167, is the stakeholder most needed by other stakeholders. The full table of degree centrality value is shown in Table 2 below.

C. Power-Interest Grid of Stakeholders

The identified stakeholders are measured their importance by the value of degree centrality. The four quadrants of the grid can be seen as defining four categories of stakeholder. The stakeholder in upper area are those with most interest in the ecosystem, but with varying degrees of power. Those in the right have more power to affect the ecosystem but may or may not actually be concerned about its activities. The two in lower area can perhaps be seen more as potential stakeholders who have not displayed much interest in the ecosystem. While in the right area may have a high degree power in the future of ecosystem. The level of stakeholder influence can be seen in Figure 2 below.

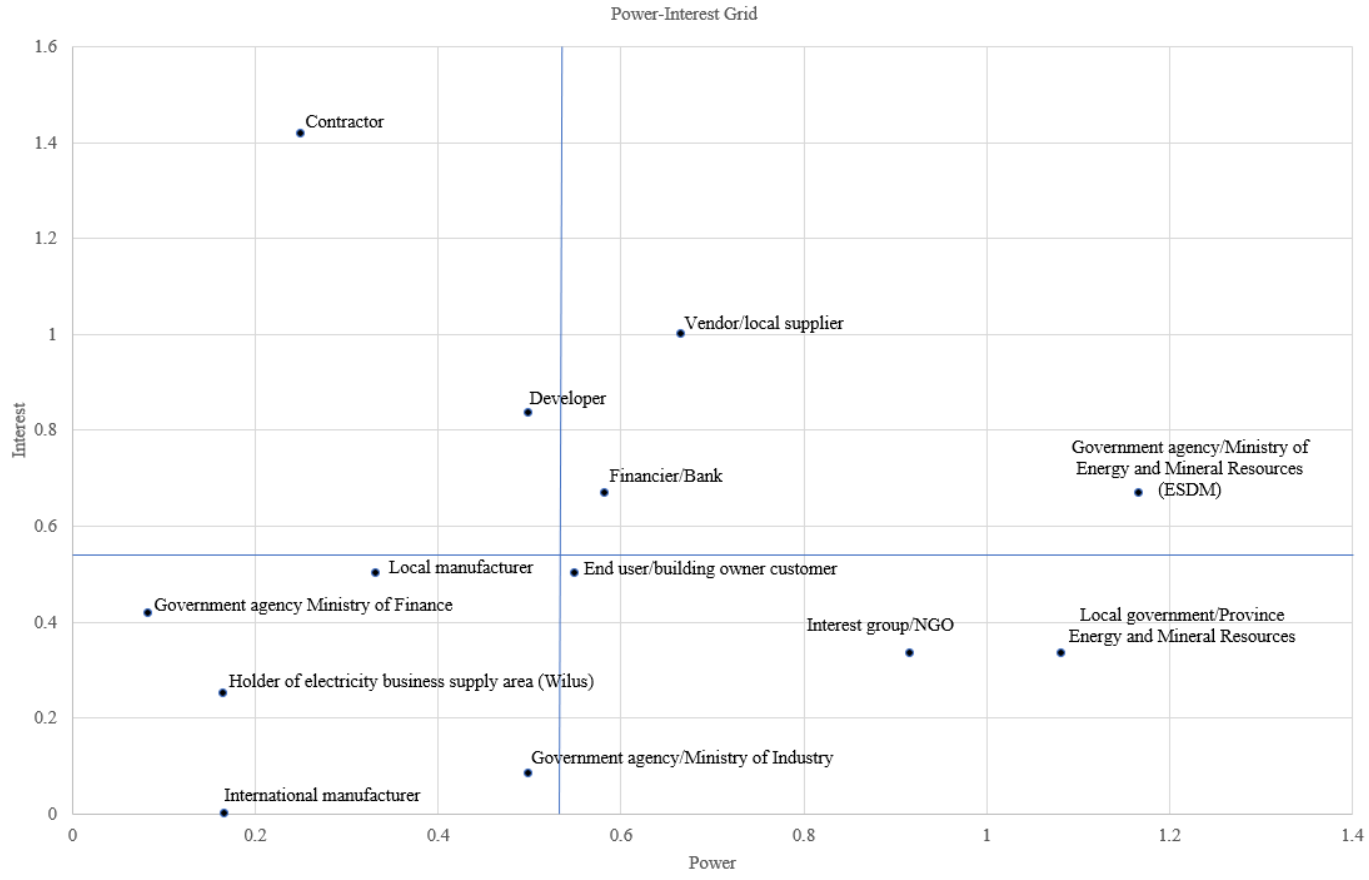

Figure 2. Power- Interest Grid of Stakeholder in the Rooftop Solar Power Plant Industry in Indonesia.

International Journal of Current Science Research and Review
ISSN: 2581-8341
Volume 07 Issue 02 February 2024
DOI: 10.47191/ijcsrr/V7-i2-36, Impact Factor: 7.943
IJCSRR @ 2024
www.ijcsrr.org

DISCUSSION

The stakeholder needs network describes every actor that constructs the ecosystem network of the rooftop solar power plant construction industry in Indonesia. An analysis to understand which stakeholders are most influential in the system is required for the designer to reconstruct the system. The level of influence and interest of the stakeholder in the decision-making process can be determined by the value of their degree centrality. High-degree nodes attract requests from numerous stakeholders due to their power to influence the value network and their potential role as bottlenecks in decision-making. In this ecosystem, the government agent/Ministry of Energy and Mineral Resources is the stakeholder with the highest indegree value of 1.167 points. Most stakeholders in the system could not work alone without regulators.

On the other hand, high-outdegree stakeholders possess a significant number of requests directed at other stakeholders. This is because they have a strong personal stake in the system and may also be dissatisfied. They have a propensity to actively engage with or have a strong interest in the system. System innovation can potentially gain advantages by listening to their input. The contractor is the stakeholder with the highest outdegree value, with 1.417 points. Contractor tends to be dependent on other stakeholders to do their part in the ecosystem, such as material procurement for the rooftop solar power plant projects, funding the projects, and regulations to lean on.

Power-Interest grid show that most powerful and interested stakeholders are in right-upper area that according to Fran Ackerman and Colin Eden, 2011 as Players who deserve sustained management attention from another stakeholders. This area contain 3 stakeholders, they are Ministry of Energy and Mineral Resources, Vendor/local supplier, and Financier/Bank. The Subjects area (left-upper) could encourage coalition to increase power and convert theirself to be Players. While right-lower area, called Contex Setters have to raise awareness and develo their interest in the ecosystem. The last area, called Crowd have unlikely to be worth for management to be concerned in time and effort. This information might useful for managers and designers to elaborate their decisions in their organization internally to be used externally.

CONCLUSIONS

This study presents a practical method to facilitate the analysis of stakeholder in an ecosystem and determine their significancy. A need network analysis assists in designing relationships among stakeholders. The efficacy of network need analysis is demonstrated by our study. It elucidates various stakeholder needs and their role in the ecosystem. The rooftop solar power plant industry is a service system that contains multiple actors and their needs. Network analysis was used to arrange and examine stakeholder needs and subsequently utilize them to assess stakeholders power and interest in the system.

Through the case study, we first found out who the stakeholders are that construct a system in general. This is expandable regarding the data sources. We found 13 stakeholders that construct the ecosystem of this industry. Secondly, we determined that there are 4 categories of stakeholders regarding their significancies. Individually, the most influential stakeholder is Government Agency (Ministry of Energy and Mineral Resources). In other hand, the most dependent stakeholder is Contractor.

The results of this research might be advantageous for designer and managers of stakeholder's in the ecosystem. They can use this information for organizational strategic purposes that benefical for their institution. The study's constraint lies in its exclusive reliance on data derived solely from in-depth interviews. Hence, the point of view of stakeholders is the biggest part of the data. Six of the thirteen stakeholders are interviewed; the data from the remaining stakeholders might be different or additional in this regard. The use of other methods on the object of this research makes it possible to seek other views that cannot be approached by this research.

REFERENCES

1. Antara. (2022, February 16). *Industri Kesulitan Pasang PLTS Atap, Ini Kendalanya - Medcom.id*. Www.Medcom.Id. https://www.medcom.id/ekonomi/bisnis/0kpv0jLN-industri-kesulitan-pasang-plts-atap-ini-kendalanya.
2. Baek, J. S., & Bhamra, T. (2022). Network Analysis of Complex Stakeholder Needs for Service Ecosystem Sustainability A Case Study of South Korean ESCO industry. *She Ji*, *8*(3), 362–386. https://doi.org/10.1016/j.sheji.2022.07.001.
3. Chinyio, E., & Olomolaiye, P. (2010). Construction Stakeholder Management. In *Construction Stakeholder Management*. Wiley-Blackwell. https://doi.org/10.1002/9781444315349.

International Journal of Current Science Research and Review
ISSN: 2581-8341
Volume 07 Issue 02 February 2024
DOI: 10.47191/ijcsrr/V7-i2-36, Impact Factor: 7.943
IJCSRR @ 2024
www.ijcsrr.org

4. Creswell, J. W. (2014). *Research Design Qualitative, Quantitative and Mixed Methods Approaches (4th ed.)*. California: SAGE Publications.
5. Creswell, J. W., & Poth, C. N. (2018). Qualitative inquiry & research design choosing among five approaches (4th ed.). *California: SAGE Publications*.
6. Ery, M. W., Rabinsa, A. H., & Muhammad, B. M. (2020, May 14). *Enhancing Decentralized Renewable Energy Investment to Achieve Indonesia's Nationally Determined Contribution - CPI*. Www.Climatepolicyinitiative.Org. https://www.climatepolicyinitiative.org/id/publication/enhancing-decentralized-renewable-energy-investment-to-achieve-indonesias-nationally-determined-contribution/.
7. Farooq, A., Akram, U., Joyia, G. J., & Akbar, C. N. (2018). A Technique to Identify Key Players that Helps to Improve Businesses Using Multilayer Social Network Analysis. *International Journal of Future Computer and Communication*, *7*(4), 98–102. https://doi.org/10.18178/ijfcc.2018.7.4.528.
8. Grimble, R., & Wellard, K. (1997). Stakeholder methodologies in natural resource management: a review of principles, contexts, experiences and opportunities. *Agricultural Systems*, *55*(2), 173–193. https://doi.org/10.1016/S0308-521X(97)00006-1.
9. Institute for Essential Service Reform. (2019). *SURVEI POTENSI PASAR ROOFTOP SOLAR DI JABODETABEK KEY FINDINGS*. www.iesr.or.id.
10. Institute for Essential Service Reform. (2021). *Market Potential of Rooftop Solar PV in Surabaya MARKET POTENTIAL OF ROOFTOP SOLAR PV IN SURABAYA: A REPORT*. www.iesr.or.id.
11. Kementerian Perindustrian. (2021, September 14). *Kemenperin: Kemenperin Targetkan TKDN Industri Panel Surya Capai 90% di Tahun 2025*. Www.Kemenperin.Go.Id. https://kemenperin.go.id/artikel/22781/Kemenperin-Targetkan-TKDN-Industri-Panel-Surya-Capai-90-di-Tahun-2025-.
12. Mok, K. Y., Shen, G. Q., & Yang, J. (2015). Stakeholder management studies in mega construction projects: A review and future directions. *International Journal of Project Management*, *33*(2), 446–457. https://doi.org/10.1016/j.ijproman.2014.08.007.
13. Nurfajri, A., Putra, R., Ariyanti, M., Millanyani, H., & Sos, S. (2023). *International Journal of Current Science Research and Review Considerations in the Adoption of Solar Home System Technology in Indonesia*. https://doi.org/10.47191/ijcsrr/V6-i10-01.
14. Renewable Energy Agency, I. (2020). *Renewable power generation costs in 2019*. www.irena.org.
15. Rowley, T. J. (1997). Moving beyond Dyadic Ties: A Network Theory of Stakeholder Influences. *The Academy of Management Review*, *22*(4), 887. https://doi.org/10.2307/259248.
16. Sugiyono. (2014). *Metode Penelitian Kuantitatif, Kualitatif, dan R&D*.
17. Wasserman, S., & Faust, K. (1994). Social Network Analysis: Methods and Applications. In *Structural Analysis in the Social Sciences*. Cambridge University Press. https://doi.org/DOI: 10.1017/CBO9780511815478.

Cite this Article: Muhammad Farhan Chairahman, Astri Ghina, Muhammad Awaluddin (2024). The Significance of Stakeholders in the Rooftop Solar Power Plant Ecosystem Industry in Indonesia. International Journal of Current Science Research and Review, 7(2), 1181-1186