

# Investigating The Smart Community Empowerment in the Utilization of Micro Hydro Power Plants (PLTMH): Enhancing The Welfare of Rural Community

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**Abstract.** The economy of an intelligent society is a concept that describes an economic system in which people have a high understanding of financial management and monetary resources. In the last decade, the idea of community empowerment by utilizing Micro hydropower plants has grown. Factors such as ecological sustainability, preservation of natural resources, and mitigation of negative impacts should be analyzed to assess the success of the project and its long-term effects. A maintained environment will help the well-being of the community, building synergies between environmental sustainability and economic development. It needs to be recognized that challenges may arise in the process of empowering intelligent communities. This study used a mixed-methods approach. The results indicate that the t-statistic is 3.527, beyond 1.96, and the p-value is 0.000, below 0.05; thus, the group's support for beneficiary empowerment exerts an indirect influence. The influence of group support on participation was indirect, indicated by a t-statistic of 8.082, surpassing 1.96, and a p-value of 0.000, which is below 0.05. The group's endorsement of rural community development exerts an indirect effect, producing a t-statistic of 5.217, surpassing 1.96, and a p-value of 0.000, which is below 0.05. Moreover, the social capital variable exerts an indirect effect on the advancement of rural communities, demonstrated by a p-value of 0.001, which is less than 0.05, and a t-statistic of 3.360, which is greater than 1.96. This finding suggests that the empowerment of intelligent communities through MHP not only improves economic welfare but also maintains balance with the surrounding environment, resulting in sustainable growth.

## 1 Introduction

The economy of an intelligent society is a concept that describes an economic system in which people have a high understanding of financial management and economic resources [1] In the last decade, the idea of community empowerment by utilizing micro hydropower plants has been in the [2]. Emerged in response to the need for the ability to manage the economy by using micro hydropower as a power plant [3]. This can reduce air pollution by

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replacing power plants with coal steam or other power plants that are financed wisely in everyday life. The background of this idea can be found in the economic challenges faced by modern society, especially amid rapid global and technological changes.

Environmental case studies impact of community empowerment are essential in understanding how the interaction between MHPP and the surrounding environment [4]. Factors such as ecological sustainability, preservation of natural resources, and mitigation of negative impacts should be analyzed to assess the success of the project and its long-term effects [5]. A maintained environment will improve community welfare by creating synergies between environmental sustainability and economic development. It needs to be recognized that challenges may arise in the process of empowering intelligent communities. Government involvement, availability of resources, and infrastructure support are determining factors for the success of this project [6]. Therefore, this community empowerment provides an opportunity to learn integrated and sustainable ways to utilize MHP as a tool for intelligent community empowerment. The focus of this research is on improving economic well-being and its positive effects on the environment.

Many previous studies have discussed community participation in the management of MHPP. The first research was conducted by [7] examining the level of knowledge of the people of Tepian Village related to the management of PLTMH, where there are human resources who can operate and maintain PLTMH properly. Indicators that affect the success of MHP management are rules formed and implemented, MHP training provided by the community, community funds or contributions, and precise institutional evaluation. The second study was conducted by [8] discussing the role of social capital elements in community empowerment activities, which act as a basis for building cooperation with other parties to form bridging social capital. Then, the third study was conducted by [9] discussing the level of participation of the Bayang Janiah community in supporting PLTMH development activities. The level of active community participation that is carried out positively can be interpreted as participation.

Empowering a bright community environment in the use of power plants is a significant effort to create energy sustainability and reduce negative impacts on the environment [10]. Empowerment encompasses not only the dissemination of knowledge but also the inclusion of the community in decision-making regarding energy source utilisation [11]. The participatory approach allows communities to participate in the selection and management of power plants that suit their local needs and situations.

Technology has a role in the use of power plants [12]. This can be seen from technological advances that provide great opportunities to develop environmentally friendly and efficient energy solutions [13]. Communities can use natural resources sustainably without compromising the environment by applying renewable technologies such as microhydro. Apart from that, the economic aspect also needs to be considered because this can help the community's economy by developing an intelligent society by utilizing micro hydro as a lever of electricity used daily, which is relatively cheap in its operation compared to the electricity offered by the government. Community empowerment, in this case, includes a local economic approach, where communities can be involved in energy production and distribution [14]. This improves the overall financial well-being of the community and creates new jobs.

Improving economic well-being is an essential challenge for many communities, especially in rural areas [15]. One proposed option is micro hydropower pumps (PLTMH), a renewable energy source that can enhance electricity accessibility in distant regions, positively influence the local economy, and promote sustainable development [16], where the MHP itself has great potential in reducing dependence on conventional energy sources, such as oil and coal, which are often expensive and damaging to the environment [17]. With the use of PLTMH, the community can get easy and cheap access to electricity. This not only

improves the quality of life in general but also opens up new opportunities in the local economic sector [18].

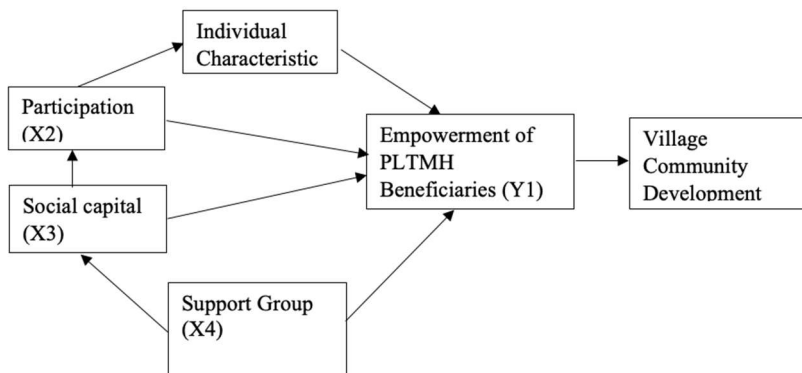
The importance of MHPP in the context of improving economic welfare lies in increasing productivity [19]. The presence of stable electricity allows small and medium-sized businesses in the region to operate more efficiently. For example, local business actors such as stalls or small industries can also develop and absorb local labor without having to incur significant costs. PLTMH can be an affordable energy resource. With relatively lower investment costs compared to conventional power plants, PLTMH can be an economically efficient choice [20]. This opens up opportunities for developing countries to access affordable energy without having to rely on increasingly expensive fossil energy sources [21]. On the other hand, MHP can also be a model for sustainable development [22]. By incorporating MHPs into development plans, a country can demonstrate its commitment to sustainable development and maintain a balance between economic growth and environmental preservation.

The purpose of this study is to determine the influence of community empowerment on PLTMH beneficiaries with the development of rural communities in Kedungrong Hamlet. This research is crucial for enhancing knowledge and awareness of community participation in environmental management through the utilization of microhydropower as an energy source. This research was conducted to develop an intelligent community economy by utilizing micro hydro as a power plant that the local community itself can manage.

## **2 Method**

This study employs a mixed methods approach, integrating both qualitative and quantitative methodologies. Qualitative inquiry examines literature related to micro hydropower plants. Qualitative research methods employing literature study techniques are data collection methodologies that concentrate on the analysis of written resources, such as notes, books, papers, articles, and journals [23]. Quantitative approaches are utilised to understand the study's subject and objectives, explicitly identify challenges through field observation, perform extensive interviews with primary and secondary sources, and collect both primary and secondary data. This study aims to uncover the essential internal and external elements affecting the sustainability of renewable energy development models, utilising a Matrix of Cross Impact Multiplications Applied to a Classification (MICMAC) data analysis.

Individual characteristics, participation, social capital, and group support are important factors in understanding the concept of empowerment of MHP beneficiaries and community development. This is similar to the research conducted by [24], which uses variables of individual characteristics, environment, and group support as independent variables and the level of empowerment of rural communities and village community development as dependent variables.



**Fig. 1.** Research Model

### 3 Results

#### 3.1 Demographic Respondents

The demographic profile of respondents in this study comprises the residents of Kedungrong Hamlet who utilize electricity from the Kedungrong PLTMH. The study comprised 51 respondents who completed questionnaires. Respondents are categorized according to their characteristics using data collected from research questionnaires, followed by the management of primary demographic information to ascertain the quantity and percentage of respondents within each characteristic. This grouping seeks to determine the distribution and demographic diversity of participants.

**Table 1.** Respondents demographic profile

No	Basic Classification	Sub Classification	Sum	Presented
1	Gender	Male	42	82,36 %
		Famale	9	17,64 %
		Total	51	100 %
2	Age	25-35 Year	4	7,84 %
		35-55 Year	8	15,69 %
		45-55 Year	19	37,26 %
		≥ 55 Year	20	39,21 %
		Total	51	100 %
3	Education	SD/MA	3	5,89 %
		SMP/Mts	12	23,52 %
		STM/SMA/Aliyah	30	58,82 %
		S1, S2, S3	6	11,77 %
		Total	51	100 %
4	Work	Village Apparatus	4	7,84 %
		Pensioner	9	17,64 %
		Farmer	14	27,46 %
		PNS	4	7,84 %
		Wiraswasta	19	37,26 %

		Policy	1	1.97 %
		Total	51	100 %
5	Income	≤ 1.000.000	12	23,52 %
		1.000.000-1.500.000	16	31,37 %
		1.500.000-2.000.000	10	19,60 %
		≥ 2.000.000	13	24,49
		Total	51	100 %

Source: Primary Data Processing, 2023

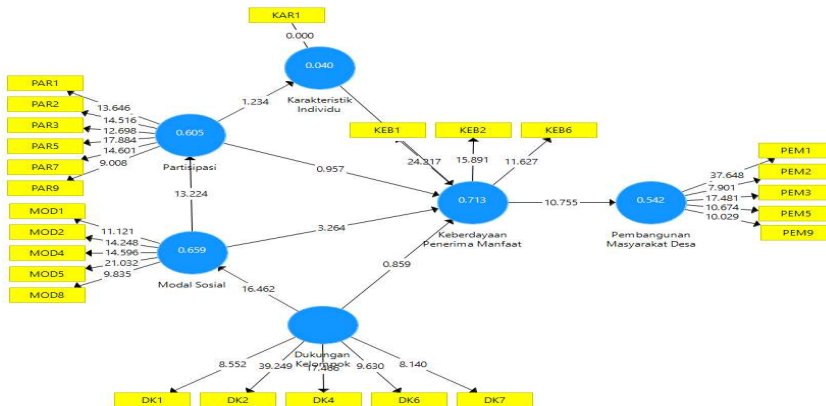
Table 4.1 presents data on respondents' demographic information based on age, education, employment, and income characteristics. Based on the information presented in the table, it can be seen that the total number of respondents is 51. The classification of respondents by gender was dominated by men, as much as 82.36%. Based on the age classification, respondents are dominated by the age range over 55 years or 39.21%. Then, the education classification is dominated by SMA / Aliyah by 58.82%. And for the type of work on average dominated by self-employed as much as 19 or 37.26%. And finally, the average income obtained in the range of IDR 1,000,000-1,500,000 / month is approximately 31.37%.

**Table 2.** R-Squared Test

Determine Variable	R-Square	R Square Adjusted
Individual characteristics	0.040	0.020
Beneficiary Empowerment	0.713	0.688
Social Capital	0.659	0.652
Participation	0.605	0.597
Village Community Development	0.542	0.533

Source: Primary Data Processing, 2023.

The outcomes of the Determination test in this study are presented in Table 5.5. The specific attributes produce an R-squared value of 0.040 in the model, indicating a weak model with a predictive capacity of only 4%. The empowerment of recipients has an R-Square score of 0.713, reflecting a model strength of 71.3%. The R-Square values for the variables of social capital, participation, and rural community development are 0.659, 0.605, and 0.542, respectively, showing moderate model fit at 65.9%, 60.5%, and 54.2%.



**Fig.2.** Inner Model Test Results using SmartPLS

The analysis of the inner model test findings in Figure 1 indicates that all indicators utilized in this study exhibit a positive route coefficient. The R-squared value and significance are two metrics employed in the evaluation of the inner model in research. The R-squared value is employed to assess the extent of variation between the independent variable and the dependent variable [25]. R-square values of 0.75, 0.50, and 0.25 signify that the model exhibits good, moderate, and weak performance, respectively. [26]. Furthermore, the criterion utilised to assess the inner model is relevancy. The t-values for the significance of the two layers 1.65 at the 10% significance level, 1.96 at the 5% significance level, and 2.58 at the 1% significance level [26].

**Table 3.** Test the *path coefficient hypothesis*, determining whether the hypothesis is accepted or rejected. The following is an explanation of the theory:

Variabel	Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	T Statistics ( O/STDEV )	P Values
Support of Beneficiary Empowerment >	0.179	0.141	0.209	0.859	0.391
Support Group -> Social Capital	0.812	0.819	0.049	16.462	<b>0.000</b>
Individual Characteristics -> Beneficiary Empowerment	-0.061	-0.065	0.092	0.661	0.509
Beneficiary Empowerment -> Village Community Development	0.736	0.750	0.068	10.755	<b>0.000</b>
Social Capital -> Beneficiary Empowerment	0.573	0.606	0.176	3.264	<b>0.001</b>
Social Capital -> Participation	0.778	0.786	0.059	13.224	<b>0.000</b>
Participation -> Individual Characteristics	0.199	0.201	0.161	1.234	0.218
Participation -> Beneficiary Empowerment	0.143	0.141	0.149	0.957	0.339

Source: Primary Data Processing, 2023.

This study performed hypothesis testing. The hypothesis is accepted when the P-value is less than 0.05. The preliminary hypothesis about personal attributes and beneficiary empowerment produces a t-statistic of 0.661, which is less than 1.96, and a p-value of 0.509, exceeding 0.05. Consequently, the preliminary hypothesis positing that these attributes do not have a positive and substantial effect on the empowerment gained from receiving MHP benefits is rejected. The second hypothesis concerning participation in benefit empowerment has a t-value of 0.957, which is less than 1.96, and a p-value of 0.339, which exceeds 0.05. Consequently, It may be stated that the second hypothesis posits that the amount of engagement does not exert a positive and significant impact on the empowerment gained

from receiving MHPP benefits, is rejected. The third hypothesis concerns individual features, demonstrating a t-statistic of 1.234, which is less than 1.96, and a p-value of 0.263, exceeding 0.05. The third hypothesis, which asserts The hypothesis that involvement level does not positively and significantly affect individual attributes is rejected.

The fourth hypothesis about the influence of social capital on beneficiary empowerment demonstrates a t-value of 3.591, exceeding 1.96, and a p-value of 0.000, which is below 0.05. According to the fourth hypothesis, accepted beneficiaries' beliefs are significantly influenced in a positive way by their social capital. The fifth hypothesis about social capital and involvement demonstrates A statistical t-value of 13.521, exceeding 1.96, and a p-value of 0.000, which is below 0.05. According to the fifth hypothesis, acceptable participation is positively and significantly influenced by social models. The sixth hypothesis about group support for beneficiary empowerment has a t-statistic of 0.940, which is more than 1.96, and a p-value of 0.348, which exceeds 0.05.

Thus, it can be concluded that the sixth hypothesis, which suggested that receivers of MHPP benefits are not significantly and positively empowered by group support, is not supported. With a t-statistic of 15.845, over 1.96, and a p-value of 0.000, below 0.05, the seventh hypothesis about group support for social capital is supported. The seventh hypothesis asserts that group support has a positive and significant effect on social capital and is considered appropriate or endorsed. The eighth hypothesis about beneficiary empowerment in rural community development has a t-statistic of 10.757, surpassing 1.96, and a p-value of 0.000. After that, or after acceptance, the eighth hypothesis suggests that beneficiary empowerment has a positive and noteworthy impact on the growth of rural communities.

## **4. Discussion**

### **4.1 The Influence of Community Empowerment in the Management of Microhydro Power Plant**

The impact of community empowerment is seen in the relationships among individual characteristics, engagement, social capital, and group support for beneficiary empowerment. Based on the analysis derived from testing various variables, the following results are obtained:

### **4.2 Influence of Individual Characteristics on the Empowerment of MHP Beneficiaries**

The research indicates that individual characteristics do not influence the empowerment of PLTMH beneficiaries, evidenced by a t-statistic of 0.602 and a p-value of 0.547, which exceeds 0.05. This is in line with research [27]. The characteristics of respondents did not affect the empowerment of the women's group, in contrast to the study [28]. There is a positive relationship between individual characteristic variables and community empowerment.

In this study, the age of respondents was dominated by vulnerable  $\geq 55$  years old at 39.21% and 45-55 years old at 37.26%. However, people who work as farmers are still quite productive, where relative He still has good physical abilities and responsiveness in supporting his farming activities. This is compared to the research [29], which states that the majority of 48-64-year-olds fall into the unproductive age category. The results showed that by encouraging productive age, physical abilities and thinking skills will increase. This is in line with research [30], which shows that age has a positive and insignificant effect.

The average formal education of respondents is STM/SMA/Aliyah graduates of 58.82%. The majority of respondents worked as self-employed employees at 37.26%, followed by farmers at 27.46%. Based on the questionnaire data obtained, the level of motivation of recipients of the electricity program from PLTMH is based on awareness of the increasingly expensive electricity needs, and electricity from PLTMH is beneficial in the event of a power outage. Then, the community is satisfied with the electricity flow from PLTMH because the price supplied is Rp 12,000 / month. This is enough to help ease the community in spending electricity costs every month.

### **4.3 The Effect of Participation on the Empowerment of Micro Hydro Power Plant Beneficiaries**

The analysis that has been carried out shows no relationship between the participation variable and the empowerment variable of PLTMH beneficiaries. The t-static value obtained at 0.987 is less than 1.96, and the p-value of 0.263 above 0.05, indicating this. In line with the research conducted by [31] his study, there was no significant relationship between participation and empowerment. Compared to the research [9] , According to the results of the study, the level of community participation in the management of the Bayang Janiah MHP is very high.

The research of social capital reveals a favourable and significant impact on the empowerment of PLTMH beneficiaries. The t-statistic value of 3.591 exceeds 1.96, and the p-value of 0.000 is less than 0.05. The role of social capital in empowerment is to bind collective bonds, reduce individual interests and desires, and help coordinate and access information to encourage broader participation. Social capital is measured through trust values, social networks, and social norms. The management of PLTMH Kedungrong Hamlet has a good social network, PLTMH beneficiary members have high trust, and the people of Kedungrong Hamlet comply with social norms in the community. In line with the research which measures social capital in these three categories, social capital on the empowerment of farmers in the rice farmer group in Jatibaru Village has a relationship with a GIS (2-tailed) value of  $0.000 < 0.005$  meaning that social capital has a significant relationship with the empowerment of farmers in the rice farmer group in Jatibaru Village.

### **4.4 The Effect of Group Support on the Empowerment of Microhydro Power Plant Beneficiaries**

Based on the results of the analysis, group support has an indirect relationship with the empowerment of MHP beneficiaries, The t-statistic is 3.527, exceeding 1.96, while the p-value is 0.000, falling below 0.05. Conversely, the research [27] group function has a natural effect on the empowerment of farmer women's groups. Then, [24] indicated that the study's results exhibited a direct and strong correlation with group support. However, the support provided by the government, both institutions and community groups in the management of the Kedungrong Micro Hydro Power Plant is sufficient.

### **4.5 Effect of PLTMH Utilization on Village Community Development**

Based on the results of the empowerment test, PLTMH beneficiaries influence, The advancement of rural communities exhibits a t-count value of 15.845, exceeding 1.96, and a p-value of 0.000, which is less than 0.0005. The economic impact of PLTMH development is felt by the people of Kedungrong Hamlet, especially by owners of micro, small, and medium enterprises (MSMEs) such as workshops, wood artisans, tailors, and so on. The existence of this power plant will increase the community in Kedungrong Hamlet from the



businesses established; the social impact of PLTMH development is changes in the pleasure of life, both tangible and intangible, encompassing health, safety, education, and various social activities.

## 5 Conclusion and recommendation

A case study on the impact of community empowerment using Micro Hydro Power Plant (PLTMH) on the environment in Kedungrong Hamlet, Kulon Progo regency, shows that MHP can empower the community intelligently. This project enables communities to engage in the creation and administration of renewable energy resources, thereby benefiting the local economy. These positive impacts include increasing the electricity supply, creating jobs, and improving the community's ability and skills to manage MHPP.

In addition, community empowerment through PLTMH in Kedungrong Hamlet, Kulon Progo regency, also showed promising results in reducing negative environmental impacts. With the active participation of the community in the management of MHPP, this project can be integrated sustainably with the preservation of the local environment. This conclusion shows that the empowerment of intelligent communities through MHP not only contributes positively to economic welfare but also maintains a balance with the surrounding environment, which results in sustainable development.

## References

1. Hasibuan, O. K. Sulaiman, Smart city, konsep kota cerdas sebagai alternatif penyelesaian masalah perkotaan kabupaten/kota, di kota-kota besar Provinsi Sumatera Utara. *Bul. Utama Tek.* 14, 127–135 (2019).
2. Y. A. Purwanto, K. Murtalaksono, S. M. Yusuf, Model Pemberdayaan Masyarakat Melalui Pengolahan Kopi di Desa Mandiri Energi. *Agrokreatif J. Ilm. Pengabd. Kpd. Masy.* 1, 28–34 (2015).
3. M. F. Budiono, Pengelolaan Sumber Daya berbasis Komunitas: Potret Penyediaan Listrik Berbasis Masyarakat di Desa Andung Biru, Kabupaten Probolinggo. *J. Soc. Dev. Stud.* 4, 324–339 (2023).
4. R. J. Kodoatie, *Tata ruang air tanah*. Penerbit Andi (2021).
5. M. Khoiruddin, *Analisis Strategi Keberlanjutan dan Inklusif dalam Mencapai Profitabilitas: Studi pada Perbankan yang Terdaftar di Bursa Efek Indonesia*. Universitas Islam Indonesia (2023).
6. R. Tanaamah, A. F. Wijaya, S. A. Maylinda, *Tata Kelola Teknologi Informasi Pada Sektor Publik: Penyelarasan Teknologi Informasi Dengan Visi Kepemimpinan*. *J. Teknol. Inf. dan Ilmu Komput.* 8, (2021).
7. G. A. Yudarwati, The Government's communication: Diffusion Innovation or Participatory Approach towards Renewable Energy Development Project. *Komun. J. Ilm. Komun.* 12, 130–143 (2023).
8. M. J. Azad, B. Pritchard, Bonding, bridging, linking social capital as mutually reinforcing elements in adaptive capacity development to flood hazard: Insights from rural Bangladesh. *Clim. Risk Manag.* 40, 100498 (2023).  
<https://doi.org/10.1016/j.crm.2023.100498>
9. H. Lalan, Analisis Partisipasi Masyarakat Terhadap Pembangunan Pltmh Bayang Janiah Iv Nagari Bayang Utara, Kabupaten Pesisir Selatan. *UNES J. Sci. Res.* 3, 88–100 (2018).
10. R. Andini, Inovasi Teknologi untuk Pariwisata Hijau: Solusi Berkelanjutan di Era Modern. *J. Kaji. Pariwisata Dan Perhotelan* 1, 39–44 (2023).
11. L. S. U. Peranginangin, Partisipasi masyarakat dalam pengelolaan kawasan konservasi.

- JKAP (J. Kebijak. dan Adm. Publik) 18, 66–78 (2014).
12. M. M. Harbelubun, S. Asriany, N. Rumkel, Teknologi Tepat Guna: Pembangkit Listrik Tenaga Mikro Hidro Terapung (PLTMHT). *Temu Ilm. Ikat. Peneliti Lingkung. Binaan Indones.* 6, D077–D082 (2019).
  13. L. Wulandari, D. D. Umar, D. Septiani, H. H. Iskandar, M. Safina, V. A. Haq, Analisis Pengaruh Globalisasi Dan Perkembangan Teknologi Nuklir Terhadap Lingkungan Hidup Yang Berkelanjutan (Sustainable Environment). *J. Bisnis Dan Manaj. West Sci.* 1, 36–50 (2022).
  14. M. Hasan, M. Azis, Pembangunan Ekonomi & Pemberdayaan Masyarakat: Strategi Pembangunan Manusia dalam Perspektif Ekonomi Lokal. CV. Nur Lina Bekerjasama dengan Pustaka Taman Ilmu (2018).
  15. M. Riyanto, V. Kovalenko, Partisipasi Masyarakat Menuju Negara Kesejahteraan: Memahami Pentingnya Peran Aktif Masyarakat Dalam Mewujudkan Kesejahteraan Bersama. *J. Pembang. Huk. Indones.* 5, 374–388 (2023).
  16. S. Allifah, P. Wijayanti, Potensi Reduksi Emisi Gas Rumah Kaca dan Kelayakan Finansial dari Pembangkit Listrik Tenaga Mikro Hidro Cisalimar, Jawa Barat. *J. Ilmu Lingkungan* 20, 900–911 (2022). <https://doi.org/10.14710/jil.20.4.900>
  17. L. Setiartiti, R. A. Al-Hasibi, MONOGRAF: TRANSISI ENERGI TERBARUKAN UNTUK PEMBANGUNAN BERKELANJUTAN. Penerbit P4I (2024).
  18. Alfiana, L. S. Mulatsih, S. Kakaly, R. Rais, L. Husnita, A. Asfahani, Pemberdayaan Masyarakat Dalam Mewujudkan Desa Edukasi Digital Di Era Teknologi. *Community Dev. J. J. Pengabd. Masy.* 4, 7113–7120 (2023).
  19. K. Khotimah, Menjaga Soliditas Bangsa melalui Swakelola Energi Terbarukan Berbasis Komunitas Masyarakat. *J. Pertahanan dan Bela Negara* 9, 21–40 (2019).
  20. A. S. R. MN, Analisa Kinerja Simulasi-Prototype Pembangkit Listrik Tenaga Mikrohidro (PLTMH) Turbin Pelton Ditinjau dari Posisi Arah Nosel Terhadap Daya Listrik Yang Dihasilkan. *Politeknik Negeri Sriwijaya* (2017).
  21. A. N. Rachmat, Indonesia dalam pusaran politik energi global. *Indones. Perspect.* 3, 66–78 (2018).
  22. R. Kurniawan, S. Suandi, S. Suryono, Analisis Keberlanjutan Pembangkit Listrik Tenaga Mikro Hidro (PLTMH) Melalui Implementasi Kemitraan Konservasi Di Taman Nasional Kerinci Seblat. *J. Pembang. Berkelanjutan* 6, 26–31 (2023).
  23. D. Subekti, The Communication in Social Media About COVID-19 Vaccine: Mapping and Bibliometrics Analysis. *J. Aristo (Social, Polit. Humaniora)* 10, 232–252 (2022).
  24. D. Rachmawatie, Pemberdayaan Masyarakat dalam Pengembangan Energi Listrik Hibrid Terbarukan bagi Pembangunan Masyarakat Desa (Studi Kasus: Pantai Baru Yogyakarta). IPB Repository (2019). <https://repository.ipb.ac.id/handle/123456789/101666>
  25. W. Abdillah, B. U. Jogiyanto Hartono, Konsep dan aplikasi: structural equation modeling berbasis varian dalam penelitian bisnis (2020).
  26. I. Ghozali, H. Latan, Partial least squares konsep, teknik dan aplikasi menggunakan program smartpls 3.0 untuk penelitian empiris. Badan Penerbit UNDIP (2015).
  27. Y. Permana, L. Effendy, M. T. Billah, Pemberdayaan Kelompok Wanita Tani Melalui Pemanfaatan Lahan Pekarangan Menuju Rumah Pangan Lestari Di Kecamatan Cikedung Indramayu. *J. Inov. Penelit.* 1, 419–428 (2020).
  28. I. Sulistiani, S. Sumardjo, N. Purnaningsih, B. G. Sugihen, Membangun keberdayaan masyarakat melalui peningkatan karakteristik individu di Papua. *J. Agribisnis Terpadu* 11, 213–225 (2018).
  29. L. Effendy, D. Badri, The farmer capacity improvement model On the implementation of rice field. *J. Soc. Sci.* 48, (2020).
  30. S. N. Sirajuddin, The work time spent by female rabbit breeders and its'influential

- factors. *J. Ilmu dan Teknol. Peternak*. 3, 61–68 (2013).
31. N. S. Nazuri, *The Exploration of Empowerment: Participation of Urban Agriculture Communities with Presence of Social Capital* (2022).