To Maega | Jurnal Pengabdian Masyarakat
Juni 2023, Vol.6, No.2, hal,320-328
ISSN(P): 2622-6332; ISSN(E): 2622-6340
http://www.ojs.unanda.ac.id/index.php/tomaega

Training and Assistance in Construction of Solar Cell Technology to Develop Community's Knowledge about Renewable Energy in Ujan Mas Village, Muara Enim, South Sumatra

Muhammad Rendana[1,*], Yandriani[1], Stevanus N. Jati[2], Puteri K. Wardhani[3], M. Ilham Fattullah[1], Rizqy M. Kusuma[1], Alifian A. A. Sonianto[1]

[1] Department of Chemical Engineering, Faculty of Engineering, Universitas Sriwijaya, Indralaya 30662 Sumatera Selatan, Indonesia,
[2]Department of Geological Engineering, Faculty of Engineering, Universitas Sriwijaya, Indralaya 30662 Sumatera Selatan, Indonesia,
[3]Department of Civil Engineering, Faculty of Engineering, Universitas Sriwijaya, Indralaya 30662 Sumatera Selatan, Indonesia

**Correspondent Email: muhrendana@ft.unsri.ac.id*

Article History:
Received: 15-12-2022; Received in Revised: 25-01-2023; Accepted: 27-02-2023
DOI: http://dx.doi.org/10.35914/tomaega.v6i2.1666

Abstract

The community development program is a prominent activity to identify and overcome local issues within community. The training and assistance program for solar cell technology application is useful to improve knowledge of community in Ujan Mas village, Muara Enim Regency, South Sumatra. The objective of this activity is to transfer knowledge of solar cell technology starting from construction to application process. The tehnique used in this community service program is the locality development approach. This activity conducted for two days (3-4 September 2022). This activity resulted in enhancing the community's knowledge of implementing solar cell technology with a 92% understanding rate, and also reducing electrical bill of community. In addition, this activity is one of a way to support the Indonesian government program to build an eletrical independent village or city. For future community development activities, we suggest to give a training program for other green energies such as biogas which used domestic and agricultural wastes to produce eletricity.

Key Word: Renewable energy, solar cell, community development

1. Introduction

Electrical energy is one of the most crucial aspects affecting our life (Al Hakim, 2020; Liu and Ansari, 2019). The increasing of human population has made a significant increase in the electrical energy demand (Aryanti *et al.*, 2020; Ali, 2020). Furthermore, many areas in this country also experiencing the electrical shortage supply due to isolated area or only limited power that supply for those areas (Azzahra *et al.*, 2019; Li *et al.*, 2020). This situation is also found in Ujan Mas village of Muara Enim, South Sumatra Province. Several issues need to be solved in the energy sector in Ujan Mas village, such as the application of

©To Maega | Jurnal Pengabdian Masyarakat. This is an open access article under the CC BY-SA 4.0 license (https://creativecommons.org/licenses/by-sa/4.0/).

the renewable energy which can be used for daily activities so that the communities do not depend on electrical energy from the State Electricity Company. The Ujan Mas Village has experienced with community service programs which carried out by universities in the Sumatra Island. They have concerned in some aspects including health services, learning literacy, and marketing development program (Dahliana *et al.*, 2022; Fatimah *et al.*, 2022; Hermawan, 2022). But, there were no community service activities that focus on the application of renewable energy, especially for electrical energy for this community life.

The use of solar energy can be carried out by using a solar cell that functions as a tool that converts solar energy into electrical energy or as a solar power plant (Kholik, 2018; Gong and Wasielewski, 2019). In smaller scale, solar cell can also be applied as a source of lighting for gardens and rooms at house. It shows how the need for public awareness about energy-saving behavior and increasing public awareness about the important role of renewable energy in energy saving and its application in daily life. This program has a direct mission to build an energy independent village or district (Pane & Kasim, 2018). Based on the reasons above, and the identification of local problems in the Ujan Mas village, the community service team conducted a community development program for constructing solar cell technology and its application as an alternative energy for daily life. The outputs of this program include enhancing community's insight and understanding of solar cell technology, reducing community expenses for electrical bill, and increasing environmental awareness to reduce dependence on fossil energy.

2. Method

This community service activity was carried out at Ujan Mas is a sub district in Muara Enim Regency, South Sumatra Province, Indonesia (Coordinates: 4°2'34"S, 103°13'31"E). The total area was about 265.56 km^2 with total population around 21,379 people. Some problems need to be mitigated in the energy sector at Ujan Mas village, such as the implementation of the renewable energy that can be used for daily activites so that the communities do not depend on electrical energy from the State Electricity Company. This community service activity applied the locality development approach, proposed by Jack Rothman (Sjöberg & Turunen, 2022). The aim of this approach is to increase the capability of community, integrate and assist them become a self-sustained thus they can mitigate their problems (Wahyuni *et al.*, 2020). It is conducted to improve the level of prosperity of the community in the Ujan Mas Village by enhancing their knowledge and emerging the responsibility and caring about the environment. The five primary work steps in this community service activity; (1) Interview and discussion to know the problem in community and find the precise solution; (2)

©To Maega | Jurnal Pengabdian Masyarakat. This is an open access article under the CC BY-SA 4.0 license (https://creativecommons.org/licenses/by-sa/4.0/).

conducting training and assistance to enhance community's knowledge in the development of technology to overcome the problem; (3) Monitoring to supervise the community's work after the implementation of technology; (4) Evaluation to measure the community's understanding and plan for future activities. In addition, in order to analyze the achievement of this activity, we distributed pre-test and post-test to the community. The pre-test and post-test were created from Microsoft Word software and printed. Then, the results of these tests were collected and tabulated in Microsoft Excel to assess percentage of level understanding using a desctiptive statistical analysis.

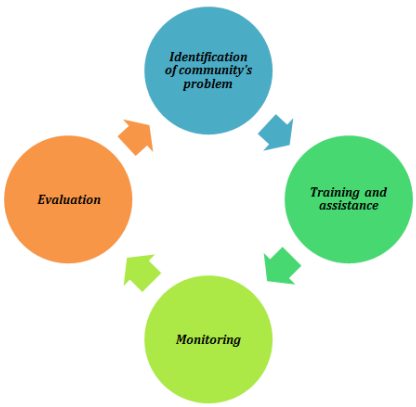


Figure 1. Framework of the community service activity.

3. Result and Discussion

The community service activity was conducted on 3-4th September 2022. The results of the activity were presented as specified below:

Survey and Group Discussion

The survey is conducted to know the community's problems such as their knowledge about solar energy, and local wisdom on the technology to be introduced. All members of community program conducted a meeting using the google meet application to arrange an activity schedule. The further survey was conducted once we met the head of village to do a discussion related to the community's problems and how the technology application in the village. The output of the survey activity, we obtained that the village had an issue regarding the electricity shortage and there were not other alternative energies that used in the village based on the survey activity and interview with communities. From analyzing problems, the real community service activity is conducted. The character of community who are very easy with the innovation and adaptation of the new technology is helpful to mitigate problems in the village. Figure 2 showed the documentation of survey and group discussion activities.

©To Maega | Jurnal Pengabdian Masyarakat. This is an open access article under the CC BY-SA 4.0 license (https://creativecommons.org/licenses/by-sa/4.0/).



Figure 2. Survey and group discussion activities.

Training and Socialization on the Application of Solar Cell Technology

Socialization is conducted to enhance the understanding of people in the application of solar cell, how to construct a solar cell, how it works, and how to use it for any tools or devices in the household. Training session was also conducted to use the technology on the household scale. The people are very passionate in the socialization and training activities. This can be observed from the excited people in discussing about solar cell technology during the socialization. But, before the training activity started, we also distributed a pretest to measure the current knowledge of the community. After we compare the result of pretest and posttest, we found an increase in the understanding of community about the solar cell technology with the highest value more than 90%.

Assistance in the construction of solar cell technology

Assistance in solar cell technology construction is carried out once in the first trial. This assistance is conducted to make sure the technology operated successfully with no error. Mentoring session could also assist the confidence of community to construct the solar cell components and create an innovative learning skill of the community, thus precise mentoring was needed for the achievement of the activity. In order to install solar panel in community's houses, firstly, we must stand scaffolding to assure safety for all installation process on the roof. Then, the solar panel mounting system should be set up with an angle ranging from 18 to 36˚ to obtain optimum sunlight exposure. After the mounts were set up, the solar panel should be installed on the mounting structure. Then, we could install the electrical wiring and solar inverter could be connected to the

©To Maega | Jurnal Pengabdian Masyarakat. This is an open access article under the CC BY-SA 4.0 license (https://creativecommons.org/licenses/by-sa/4.0/).

system. After that, the solar inverter was connected to the solar battery. The inverter must be connected to the community's house to produce electricity.



Figure 3. Training and socialization and activities for the application of solar cell technology in the village.



Figure 4. Assistance in the construction of solar cell technology.

Monitoring and evaluation

Monitoring and evaluation are used to assess the drawbacks and arrange a plan and decide what actions should be done for future betterment. This evaluation involved the community service team and also the head of the village. As a whole, the entire processes in the construction of solar cell technology in the village have successfully run from preparation, construction and application.





© SA 4.0 l

Figure 5. Monitoring and evaluation.

Community service is an activity to develop the ability or skill of the people in implementing a new knowledge or technology in their environment maximally to increase the quality of life of the people. Community development activity through assistance and training in the application of solar cell technology such as: 1) Pre survey and group discussion; 2) Socialization and training on the application of solar cell technology; 3) Assistance in constructing solar cell technology; 4) Monitoring; 5) Activity evaluation.

In the community service activities, data were gathered, consisting of pre test and post test data on community's understanding before implementing technology. The data are shown in Tables 1 and 2.

Table 1. Pre test.

No.	Question	Level of understanding (%)			
		Very High	High	Medium	Low
1	Understanding renewable energy and its potential	0	0	30	70
2	Understanding use of solar energy technology	0	0	40	60
3	Understanding components of solar cell technology	0	0	20	80
4	Understanding installation of solar cell technology at home	0	0	10	90

Table 2. Post test.

©To Maega | Jurnal Pengabdian Masyarakat. This is an open access article under the CC BY-SA 4.0 license (https://creativecommons.org/licenses/by-sa/4.0/).

No.	Question	Level of understanding (%)			
		Very High	High	Medium	Low
1	Understanding renewable energy and its potential	90	5	5	0
2	Understanding use of solar energy technology	85	10	5	0
3	Understanding components of solar cell technology	80	15	5	0
4	Understanding installation of solar cell technology at home	80	10	10	0

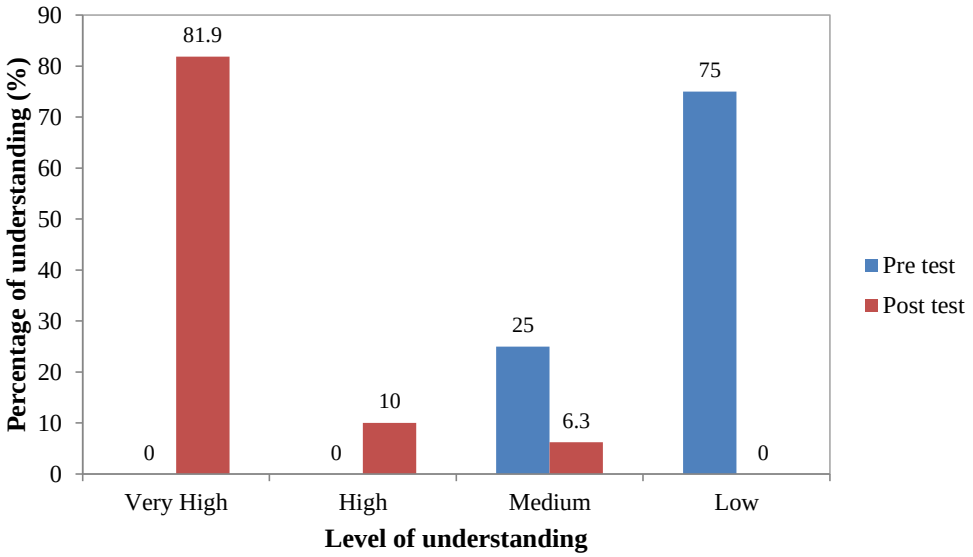


Figure 6. Percentage of improved understanding of community before and after training and assistance.

The mentoring activity was conducted at all entire process. It is a prominent way to achieve the success of community service activity. There are some principles of community assistance such as: 1) Community development basically originates from the community itself, is provided by the community, and to serve the community; 2) facilitator requires the community as the primary participant, 3) Learning and sharing of experiences are public or innovative insight should be selected good (Nasdian, 2014).

4. Conclusion

The outputs concluded from the application of Training and Assistance in solar cell technology to mitigate electrical scarcity and as an alternative energy in

©To Maega | Jurnal Pengabdian Masyarakat. This is an open access article under the CC BY-SA 4.0 license (https://creativecommons.org/licenses/by-sa/4.0/).

Ujan Mas village, Muara Enim, South Sumatra Province are 1) enhancing community knowledge in using solar cell technology with the percentage of understanding up to 92%, 2) lowering electrical bill of community expense due to solar cell. Several actions that need to be carried out for future works are to try other solar panel component which able to give more electrical power. For future community development activities, we recommend to give a training program for other green energies such as biogas which used domestic and agricultural wastes to produce eletricity because the abundance of organic wastes in that area.

5. Acknowledgment

The author would like to thank Sriwijaya University for providing PNBP grants for community service, SATEKS Scheme in 2022 accordance with Rector decree No. SK: 0005/UN9/SK.LP2M.PT/2022 so that this activity can be completed on time. This article was an additional output from this research grant.

6. Reference

Al Hakim, R. R. (2020). Model energi Indonesia, tinjauan potensi energi terbarukan untuk ketahanan energi di Indonesia: Sebuah ulasan. Jurnal Pengabdian Kepada Masyarakat, 1(1).

Ali, S. S. S. (2020). The nexus of population, GDP growth, electricity generation, electricity consumption and carbon emissions output in Malaysia. International Journal of Energy Economics and Policy.

Aryanti, I. P., Yanto, Y., & Kalsum, N. U. (2020). Upaya Menumbuhkan serta Meningkatkan Minat Baca pada Anak-anak Melalui Program Literasi Belajar Bersama Di Desa Ujan Mas Ulu. Kreativitas: Jurnal PKM Ilmu Perpustakaan, 2(2), 48-53.

Azzahra, S., Christiono, C., Samsurizal, S., Fikri, M., Ratnasari, T., Putra, R. P., & Damiri, D. J. (2019). Pemasangan Lampu Jalan Berbasis Solar Cell untuk Penerangan Jalan di Desa Cilatak Ciomas. Terang, 1(2), 137-143.

Dahliana, D., Retnosari, E., Clarasari, N., & Hairunisyah, R. (2022). Pemberdayaan Kader Posyandu dalam Peningkatan Produksi Asi Melalui Teknik “BOM”(Breast Care, Oksitosin dan Marmet) di Klinik Asy-Syifa Desa Ujanmas Baru Kec Ujanmas Kab Muara Enim. Jurnal Kreativitas Pengabdian Kepada Masyarakat (PKM), 5(4), 1144-1153.

Fatimah, S., Khairunisya, K., Kamalia, R., & Nurayuda, N. (2022). Pendampingan Kelas Ibu Hamil Melalui Peningkatan Pengetahuan dan Keterampilan Senam Hamil di Klinik Asy-Syifa Desa Ujanmas Kecamatan Ujanmas Kabupaten Muara Enim. Jurnal Kreativitas Pengabdian Kepada Masyarakat (PKM), 5(5), 1347-1355.

Gong, J., Li, C., & Wasielewski, M. R. (2019). Advances in solar energy conversion. Chemical Society Reviews, 48(7), 1862-1864.

©To Maega | Jurnal Pengabdian Masyarakat. This is an open access article under the CC BY-SA 4.0 license (https://creativecommons.org/licenses/by-sa/4.0/).

Hermawan, Y. (2022). Sosialisasi Dan Pelatihan Pembangkit Listrik Tenaga Mikrohidro Untuk Masyarakat Daerah Pelosok Dan Pertanian. Stator: Jurnal Ilmiah Mahasiswa Teknik Mesin, 5(1), 38-42.

Kholik, I. N. (2018). Pemberdayaan Masyarakat Desa Melalui Community Development (Studi Desa Kasiman Kecamatan Kerek Kabupaten Tuban) (Doctoral dissertation, Universitas Brawijaya).

Li, J., Liu, P., & Li, Z. (2020). Optimal design and techno-economic analysis of a solar-wind-biomass off-grid hybrid power system for remote rural electrification: A case study of west China. Energy, 208, 118387.

Liu, X., & Ansari, N. (2019). Toward green IoT: Energy solutions and key challenges. IEEE Communications Magazine, 57(3), 104-110.

Nasdian, F. T. (2014). Pengembangan masyarakat. Yayasan Pustaka Obor Indonesia.

Pane, N. E. P., & Kasim, S. T. (2016). Studi Potensi Energi Baru Terbarukan untuk Mengatasi Defisit Pasokan Tenaga Listrik di Daerah Sumatera Utara. Jurnal Singuda Ensikom, 14(38), 1-6.

Sjöberg, S., & Turunen, P. (2022). Community work in Nordic welfare states in transformation: directions, conditions and dilemmas. Nordic Social Work Research, 12(2), 209-216.

Wahyuni, E. S., Mubarok, H., Budiman, F. N., & Pratomo, S. W. (2020). Pemanfaatan Energi Terbarukan untuk Pembangkit Listrik Tenaga Surya Berbasis Komunitas: Menuju Desa Mandiri Energi. Engagement: Jurnal Pengabdian Kepada Masyarakat, 4(2), 493-508.

©To Maega | Jurnal Pengabdian Masyarakat. This is an open access article under the CC BY-SA 4.0 license (https://creativecommons.org/licenses/by-sa/4.0/).