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Designing Productive Waqf-Based Financing Model for Renewable Energy Investments Project: Empirical Evidence from Indonesia

ABSTRACT

This research examines the potential of productive waqf as an innovative financing solution for renewable energy projects, particularly Solar Power Plants (PLTS) in Krandegan Village, Central Java. With an approach of cash, asset, and land waqf, this research offers a sustainable financing model that not only supports agricultural efficiency through renewable energy-based irrigation but also enhances the overall well-being of the community. This study uses qualitative methods with a case study approach, involving in-depth interviews with various stakeholders. The results show that productive endowments have great potential in overcoming the funding limitations of renewable energy projects, supporting national energy mix targets, and providing extensive social and economic benefits. The proposed model can be replicated in other regions with similar solar energy potential.

Keywords: Waqf Productive, Renewable Energi, Investment

Üretken Vakıf Tabanlı Finansman Modeli Tasarımı: Endonezya'dan Yenilenebilir Enerji Yatırımları İçin Ampirik Bulgular

ÖZET

Bu araştırma, üretken vakıf modelinin, özellikle Orta Java'nın Krandegan Köyü'nde Güneş Enerjisi Santralleri (GES) için yenilikçi bir finansman çözümü olarak potansiyelini incelemektedir. Nakit, varlık ve arazi vakfı yaklaşımlarıyla bu araştırma, yenilenebilir enerjiye dayalı sulama yoluyla tarımsal verimliliği destekleyen ve aynı zamanda toplumun genel refahını artıran sürdürülebilir bir finansman modeli sunmaktadır. Çalışma, nitel araştırma yöntemlerini ve durum analizi yaklaşımını kullanarak çeşitli paydaşlarla yapılan derinlemesine görüşmeleri içermektedir. Sonuçlar, üretken vakıf modelinin, yenilenebilir enerji projelerinin finansman sınırlamalarını aşmada, ulusal enerji karışımı hedeflerini desteklemede ve geniş kapsamlı sosyal ve ekonomik faydalar sağlamada büyük bir potansiyele sahip olduğunu göstermektedir. Önerilen model, benzer güneş enerjisi potansiyeline sahip diğer bölgelerde de uygulanabilir.

Anahtar Kelimeler: Üretken Vakıf, Yenilenebilir Enerji, Yatırım

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INTRODUCTION

Global warming and climate change have become a concern for countries around the world, starting with the 21st UN Conference in 2015, which discussed climate change issues in Paris, resulting in an agreement among several countries to commit to addressing global warming by reducing greenhouse gas emissions with a target of 25% by 2025 and 29% by 2030. (Lisbet, 2015). The Indonesian government also demonstrates its commitment and contribution by setting a national renewable energy mix target of 23% by 2025 and achieving net zero emissions by 2060 (Ministry of Energy and Mineral Resources, 2021). However, unfortunately, the development of renewable energy in Indonesia is still relatively slow and lagging behind, as seen from the achievement in 2023, While the achievement of 13.1% falls short of the 2023 target of 17.9%, it still signifies meaningful progress, reaching approximately 73% of the goal. This demonstrates a solid step forward in efforts to enhance renewable energy development in Indonesia (Paramita & Pranchiska, 2024).

Indonesia, as an archipelagic country and the fourth most populous in the world, has a significant impact on primary energy consumption and the depletion of natural resources. (Rudenko & Tanasov, 2022). Thus, it becomes a unique challenge in the equitable distribution of electricity access and achieving the renewable energy mix targets. In fact, the utilization of new renewable energy is one of the strategies in the context of equity and supporting Indonesia's commitment to emission reduction through the renewable energy mix targets. Based on 2023 data, Indonesia's primary energy is still dominated by the coal sector with a composition of coal (40.46%), crude oil (30.18%), natural gas (18.28%), and new renewable energy (13.09%) (Paramita & Pranchiska, 2024).

Indonesia has great potential in implementing renewable energy, reaching up to 419 GW, consisting of 75 GW of hydro energy, 23.7 GW of geothermal, 32.6 GW of bioenergy, 207.8 GW of solar, 60.6 GW of wind, and 19.3 GW of micro-hydro. (Rudenko & Tanasov, 2022). Solar Power Plants (PLTS) have great potential, but their utilization has not been maximized until now. One of the main factors is the financing issue, as it requires a large initial investment. Therefore, innovative and sustainable financing alternatives are needed (Muin, Z. A., Sapri, M., Sipan, I., Jalil, R. A., & Razak, 2024).

Based on the Climate Policy Initiative Report, the investment gap in Indonesia for generating electricity from renewable energy reaches up to 98% each year. (Wijaya, M.E., Haesra, A., Mecca, 2020) and recorded from 2011 to 2020, the RE project was mostly funded by debt (International Renewable Energy Agency, 2022) ironically causing unsustainability for those countries (Ari, I., Koc, 2018, 2019). Thus, through Islamic social finance, productive waqf has great potential in funding green energy projects by utilizing waqf land scattered across 440.5 thousand points with a total area of 57.2 hectares and a potential of 180 trillion rupiah per year in cash waqf, which has been realized at 1.4 trillion rupiah in 2022 (BWI, 2022)

Productive waqf refers to the utilization of waqf assets managed productively to generate profits that are then distributed according to Sharia objectives, one of which is the development of green energy infrastructure (Rahman et al., 2021). Waqf also has an inherent principle of sustainability, making it highly relevant for funding long-term projects (Cizakca, 1998; Hasan,

Z., & Abdullah, 2008). One of the uses of waqf is to finance renewable energy projects. Based on previous research, the concept of waqf has been applied in the energy sector as done by (Ari & Koc, 2021; Mukhtasor et al., 2023). However, empirical research on the application of waqf in the renewable energy sector, particularly using solar power plants (PLTS), is still rarely implemented, especially in Indonesia.

Krandegan Village, located in Central Java with high solar energy potential, can serve as an example of implementing productive endowments to fund solar power plant projects. In 2022, Krandegan Village successfully built a Solar Power Plant (PLTS) with a capacity of approximately 18 Kilowatts, funded by a grant from the Provincial Government. The solar power plant (PLTS) is utilized for agricultural irrigation, allowing the community to experience the impact of the PLTS in terms of efficiency. However, since not all agricultural land can be reached, the Krandegan Village Government is building another solar power plant unit to maximize the potential of the agricultural land. (Dwinanto, 2023) as one of the largest rice-producing regions in Indonesia, but due to funding limitations, the project has not yet been realized.

Thus, this research aims to design a productive waqf-based financing model as an alternative investment for solar power plants (PLTS) in Karandegan Village. It is expected that this research can produce a modeling of the productive waqf model to address funding issues in the management and utilization of renewable energy, and can be adopted and implemented in other regions with similar potential.

Literature Review

Productive Waqf

Waqf (plural = awqaf) comes from the root word waqafa-yaqifu-waqfan. The word means to stop, hold back, remain silent, or stand. Waqf, by definition, means protecting the principal of an asset and providing its benefits to others (Yaacob, H., Petra, S. and Sumardi, 2015). Another opinion defines waqf as an ethical mechanism to hold the principal asset so that it can be managed in such a way that its benefits can be obtained by the beneficiaries in the context of philanthropy (Ascarya et al., 2022). Waqf as the eternal charity of Islam is characterized by all the blessed qualities of charity and moral sustainability throughout social actions, which originate from the Quran (Choudhury, M.A., Pratiwi, A. and Hoque, 2019). Waqf can be categorized into social waqf, productive waqf, or integrated social and productive waqf (Ascarya, A., Sukmana, R. and Hosen, 2020).

Data from the Ministry of Religious Affairs for the year 2023 states that Indonesia has 440,512 locations of waqf land covering an area of 57,263.69 hectares. From this distribution, 14.87% of waqf land is utilized for schools and Islamic boarding schools (pesantren). Additionally, 9.37% is used for other socio-economic activities, including the empowerment of the agricultural sector, livestock, and micro, small, and medium enterprises (Sistem Informasi Wakaf, Sistem Informasi Wakaf Kementerian Agama, 2022). However, unfortunately, the utilization of land waqf in Indonesia is still largely oriented towards the development of mosques, cemeteries, and schools or Islamic boarding schools. (Ascarya et al., 2022).

In fact, the potential for productive waqf in Indonesia is very large, and making waqf productive is one way to provide greater socio-economic benefits to society, such as addressing

issues of poverty, hunger, inequality, lack of empowerment in gender issues, human resource development, and a sustainable ethical-economic future, in accordance with the theory of the unity of knowledge, Tawhid (Ascarya et al., 2022). And productive waqf has great potential in addressing the financial, ethical, and human capital deficiencies faced by conventional financial institutions (Haneef, M.A., Pramanik, A.P., Mohammed, M.O., Amin, M.F. and Muhammad, 2015). Productive waqf can also be considered an ethical business/investment, as it must comply with Islamic law, not only being free from riba (interest), gharar (unclear transactions), and maysir (gambling) but also upholding other Islamic ethical systems (Sadeq, 2002).

Productive waqf is the development of waqf where the represented assets will be invested to generate productivity through various means permitted by Sharia (Baharsyah, M. F. F., Yayuli, Y., Hakim, L., & Athief, 2022a). Productive waqf must be able to generate returns because, after all, the goal of productive waqf can only be achieved if the waqf assets have been created, and only then can the results be used for the intended purpose (Syakir, 2016). In managing productive endowments, it is necessary to have the right managers or nadzir so that what is endowed is not only handled as a trust but also can be produced, allowing the benefits from the results or surplus of the endowment to be continuously felt and disseminated. (Baharsyah, M. F. F., Yayuli, Y., Hakim, L., & Athief, 2022b).

Productive waqf can take the form of movable objects such as vehicles, cash, and jewelry, as well as immovable objects such as land, buildings, and houses. (Nur Iman, A. K., Najiyah, F., & Asshiddiqi, 2021). Some forms of waqf that can be productive today, besides land waqf, are cash waqf. Mohsin (2013) argue that cash waqf has the potential to function as a financial institution that provides funding for various goods and services in different countries, thereby reducing individuals' dependence on government assistance to meet their needs (Mohsin, 2013). According to Nurjannah and Abdullah (2020), provision of working capital assistance, donations to orphans, school building renovations, establishment of health facilities, and business capital assistance are examples of how cash waqf can help communities improve their welfare and economic prosperity (Nurjannah, N. and Abdullah, 2020). The explanation was supported by Mohsin (2013) which states that cash waqf, in addition to serving as a source of funding for public facilities such as education, health, social activities, and commercial ventures, can create new job opportunities by expanding employment opportunities for the wider community (Mohsin, 2013).

METHOD

Research Methodology

This research uses a qualitative research method with a case study approach in Krandegan Village. This study was conducted by reviewing previous literature that focuses on the potential of productive waqf for low-cost financing in the renewable energy sector by developing an integrative financing model. Due to the lack of literature discussing this topic and its specific nature (case study), in order to strengthen the analysis, the researcher conducted in-depth interviews. (Creswell, 2014) consisting of regulators, practitioners, and academics in the fields of waqf and renewable energy. In addition, the expertise of each respondent also

serves as input for designing the proposed model. (Yin, 1989) so that the developed model can be realistic and feasible (Implementable).

Data Tpyes, Data Collection and Data Analysis

This research uses primary and secondary data. The primary data in this study comes from in-depth interviews with informants consisting of regulators, academics, and practitioners involved in endowments and agriculture. Based on the research by O. Nyumba, Wilson, Derrick, & Mukherjee (2018) also suggests that the number of participants in in-depth interviews/Focus Group Discussions should be a minimum of 3 and a maximum of 21, with a median of 10 (O.Nyumba, T., Wilson, K., Derrick, C. J., & Mukherjee, 2018). Therefore, the researchers chose 7 stakeholders.

Tabel 1. Daftar Narasumber FGD

No	Respondent Initial	Institutions/Expertise
1	AD	Waqf Administrators in Karandegan Village
2	EP	Head of the Renewable Energy Division, Department of Energy and Mineral Resources (ESDM) Purworejo Regency.
3	SI	Manager of the Solar Power Plant Grant in Krandegan Village.
4	RT	Farmers Benefiting from the Solar Power Plant in Kradegan Village.
5	RF	Community.
6	AF	Finance and Investment Manager, BMT Al-Falah Syariah.
7	DO	Head of Krandegan Village

Source: Processed, 2024

Researchers use data/source triangulation techniques and methods to strengthen the analysis. Data/source triangulation is carried out by using multiple data sources so that weaknesses in one data source can be compensated by the strengths of additional data to enhance the validity and reliability of the results (Rugg, 2010). In this research, data obtained through documentation will be cross-checked using the results of in-depth direct interviews with expert respondents and vice versa. Meanwhile, triangulation is conducted by cross-checking the results of documentation in previous journals/studies that need to be reviewed more thoroughly from the implementation perspective in the field, compared to data from in-depth interviews involving academics, regulators, and practitioners. This way, the in-depth interview method can cover the weaknesses of library research methods, so that the analysis to answer the problem formulation is expected to be more valid and worthy of review from both academic and practical perspectives.

RESULTS AND DISCUSSION

The geographical, social, and economic conditions of Krandegan Village in supporting the development of solar power plants.

Krandegan Village, located in Bayan District, Purworejo Regency. Known as an advanced and independent village in Central Java because it has successfully become a model smart village. The Krandegan Village Government for the period 2019-2025 has a vision to realize a self-sufficient and prosperous village, both physically and spiritually, by focusing on the agricultural sector, strengthening the people's economy, and developing the people's industry, supported by a professional governance system and backed by reliable natural and human resources.

Desa Krandegan is located in a lowland area and has quite extensive agricultural land, where out of the 161 hectares of the village, 70 hectares are rice fields based on rain-fed irrigation. Thus, this village is one of the contributors to food security in Central Java. Before 2013, land irrigation only utilized rainwater, resulting in one harvest per year and often experiencing crop failures. This led to suboptimal agricultural yields and frequent crop failures. Based on the interview results, the solutions and innovations implemented by the Village Head, in collaboration with various parties, initially utilized the river's potential using diesel for the agricultural irrigation system. However, using diesel was not effective and optimal in covering the entire agricultural land. And currently, they are starting to switch to utilizing solar energy with solar power plants (PLTS) for the agricultural irrigation system.

The Krandegan Village Solar Power Plant was obtained through collaboration with various parties. Until now, there are 3 solar power plants, the first of which is sourced from the Central Java Provincial Government with a large capacity of 18,000 watts, used to irrigate 35 hectares of agricultural land. The presence of these solar power plants has had a significant positive impact on agricultural land irrigation. So that farmers can maximize their harvests three times a year compared to previously only once a month. Another solar power plant was obtained through collaboration with academic institutions and is used for street lighting.

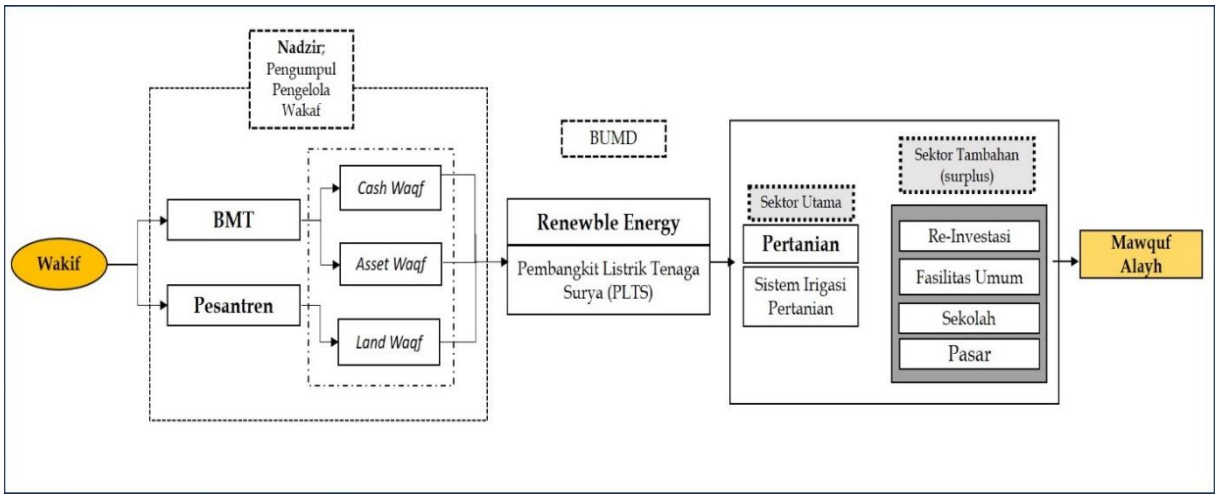
However, the problem faced by the community now is that the existing solar power plants (PLTS) cannot fully cover the irrigation needs of all rice fields until nighttime. Although the pumps used can be hybrid, utilizing solar panels during the day and PLN electricity at night, the limited capacity of the PLN electrical network in the village means that the PLTS cannot cover everything. Therefore, in order to maximize agricultural yields by covering the irrigation needs of all rice fields, a new breakthrough is needed besides waiting for grants from the government or CSR. One of the efforts that can be utilized is the use and empowerment of Islamic social financial instruments, one of which is through waqf.

Based on the interview results with the waqf administrators in Krandegan Village, the waqf currently managed is mostly in the form of land used for public facilities such as mosques and education, as well as waqf funds used for social activities. The overall condition of the waqf is quite good, but there is still room for development so that waqf assets can provide greater and more sustainable benefits to the community.

Previous experiences in managing productive waqf have shown success in utilizing waqf land for agriculture. The agricultural yields not only met the operational needs of the mosque but also helped the needy community. This experience proves that productive waqf can be an

effective instrument in improving community welfare and promoting community-based economic development, so productive waqf also has great potential as an alternative financing for sustainable projects such as Solar Power Plants. (PLTS). Thus, with proper management, the results of productive waqf can be allocated to support the social, religious, and economic needs of the community, such as the operational costs of mosques, education, and other social programs. This aligns with the sustainability principles upheld in Islam and can serve as an innovative solution in rural economic development.

Figure 1. Model and Financing Mechanism



Source: Processed, 2024

A. Wakif (Pemberi Wakaf)

Wakif is an individual, group, or institution that endows waqf. Waqf is managed professionally to provide productive benefits for the community. In this scheme, there are three productive waqf used, namely

1. **Cash Waqf**

   Cash waqf is a form of liquid waqf that is very flexible for use in various aspects of solar power plant development. Its allocations include:

   a. Initial Capital Investment

      Cash waqf serves as an initial investment to finance the procurement of key components for solar power plants (PLTS) such as solar panels, inverters for electricity conversion, energy storage systems like batteries, and other supporting devices like cables and transformers.

   b. Initial Operational Costs

      Funding used to cover the operational activities of the initial phase, which includes payments to experts or technicians for PLTS installation, logistics costs for transporting PLTS components to the construction site, and training local personnel for PLTS management.

   c. Maintenance and Repairs

      Cash waqf also plays a role in financing the routine maintenance of PLTS, including cleaning solar panels to maintain efficiency, replacing batteries after

their lifespan ends, and repairing damaged components.

d. Development of Supporting Infrastructure
   Cash waqf is also used to finance the construction or renovation of supporting facilities, such as control rooms for operating solar power plants (PLTS) and the expansion of PLTS capacity for other uses.
e. Reinvestment
   A portion of the profits and surplus from the management of the solar power plant (PLTS) is reinvested into other projects, such as building additional solar power plants or funding other productive waqf projects.

2. Asset Waqf

Waqf assets include physical goods or facilities utilized to support the construction and operation of solar power plants (PLTS), and their utilization consists of.

a. Buildings or Structures
   Waqf buildings can be used to facilitate control rooms, storage for inverters, batteries, and energy management systems, as well as training rooms for technicians or operators managing solar power plants.
b. Supporting Equipment
   Assets in the form of technical equipment such as generators, energy monitoring devices, or measuring instruments can be directly used to support the installation and maintenance of solar power plants.
c. Optimization of Unused Assets
   Unused buildings or spaces can be repurposed as warehouses for storing solar panels, backup batteries, or other components.
d. Assets for Socialization and Education
   Waqf facilities, such as halls or multipurpose rooms, can be used for educational activities related to the use of renewable energy for the community.

3. Land Waqf

Land waqf plays a key role in the development of solar power plants (PLTS), as PLTS requires large areas and strategic locations. The management and provision of waqf land in this model collaborate with pesantren. Currently, pesantren not only play a role in the field of education but also in the fields of social, economic, religious, and cultural aspects. The economic independence of pesantren is partly achieved through the empowerment of waqf. The management of pesantren using waqf instruments has implemented waqf-based productive independence by utilizing palm oil plantations, hospitals, garment factories, bakeries, and other ventures(Trubusiman, 2024). Thus, pesantren have become very prospective objects in the development of productive waqf, especially in the provision of natural resources and land for waqf properties owned by pesantren (Siddiq, 2018; Sukmana et al., 2024). The utilization of waqf land is as follows,

a. Location of Solar Panel Installation
   The land that has been endowed is used for the installation of a large number of solar panels. The ideal location is an area that receives optimal sunlight exposure

throughout the day.

b. Development of Supporting Infrastructure
In addition to being used for the installation of solar panels, the land can also be used to build control rooms and warehouses, an electricity distribution system to surrounding areas, and additional facilities such as access roads to the solar power plant location.

c. Agricultural Irrigation System
If the land is near agricultural areas, the solar power plant built can support irrigation systems for rice fields through solar-powered water pumps.

d. Potential for Additional Productive Projects
The vast land can be utilized for the development of other activities, such as: Agriculture using electricity from the solar power plant. The construction of public facilities, such as markets or schools, utilizing electricity from the solar power plant.

B. Management of Endowments by Nadzir

Nadzir is an institution or individual responsible for managing and utilizing waqf according to sharia principles. Managing productive waqf requires the right manager or nadzir so that what is endowed is not only handled as a trust but can also be produced, allowing the benefits from the results or surplus of the waqf to be continuously felt and disseminated (Baharsyah, M. F. F., Yayuli, Y., Hakim, L., & Athief, 2022b).

a. Nadzir manages the waqf received from the waqif through two main channels, namely through BMT to collect and manage waqf in the form of cash. And the pesantren plays a role in managing the waqf land that will be used for the productive project of PLTS Development.
b. Nadzir's task is to ensure that the management of waqf generates sustainable benefits by investing in the productive sector, in this case, renewable energy.

C. Conversion of Endowments into Productive Projects

a. The collected endowments are allocated for the construction of Solar Power Plants (PLTS). PLTS is an environmentally friendly renewable energy source with long-term sustainability value.
b. This project was chosen due to its wide-ranging benefits, namely to meet the electricity needs of agriculture using clean and renewable energy to optimize and enhance agricultural efficiency, thereby supporting local economic development.

D. Utilization of Solar Power Plants in the Agricultural Sector

a. The electricity generated by solar power plants (PLTS) is used for various needs in the agricultural sector, especially for irrigating rice fields.
b. The solar-powered irrigation system involves regional-owned enterprises (BUMD) and local farmer teams.
c. This not only supports the sustainability of the agricultural sector but also improves the welfare of local farmers.

E. Distribution of Benefits from Productive Endowments

The benefits generated from this solar power plant (PLTS) are distributed to various sectors, with the primary goal of improving community welfare. (Mawquf Alayh). Its

distribution includes:

a. Re-Investment, a portion of the profits from the management of the solar power plant (PLTS) is reinvested to support the development of other waqf projects, such as infrastructure or the development of public facilities.
b. Social, energy from the PLTS is also utilized for social needs, such as street lighting in areas that require it.
c. Schools, the proceeds from the management of waqf also support school operations, both through the provision of electricity for educational facilities and additional funds for schools.
d. Market or traditional markets in the area can also gain access to electricity from the solar power plant to support their economic activities.

F. Beneficiary (Mawquf Alayh)

Mawquf Alayh is the party that receives the benefits from the management of waqf. This benefit is provided both directly and indirectly with the aim of creating equitable welfare in the community. In this scheme, the beneficiaries include:

a. Farmers who benefit from renewable energy-based irrigation.
b. The general public who gain access to street lighting and other facilities.
c. Institutions such as schools and markets that benefit from the results of the solar power project.

CONCLUSION

This research emphasizes that productive waqf has great potential as an innovative financing instrument for renewable energy projects, such as solar power plants in Krandegan Village. Cash, asset, and land-based waqf approaches can be sustainable solutions that not only support agricultural efficiency through renewable energy-based irrigation but also enhance the overall welfare of the community. The importance of professional management of waqf through Nadzir is a key point in ensuring the sustainability and optimization of waqf benefits productively. With proper implementation, this model can become a real solution in addressing the challenges of renewable energy financing in Indonesia, supporting the national energy mix targets, and providing broad socio-economic benefits to the community.

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