

Case Study
Micro-Hydropower Plant: Passion and Commitment

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“Come to Cinta Mekar¹ village in Subang, West Java, Indonesia, and see how low-cost electricity changes the face of an entire village and grabs the attention of the world”

Her name is Tri Mumpuni or Puni to be short. People know her as a simple, humble, and kind individual. A mother of two daughters, together with her husband, **Iskandar Kuntoaji**, they have dedicated their life to the well-being of the villagers. Through their nonprofit IBEKA Foundation (*Yayasan Institut Bisnis dan Ekonomi Kerakyatan* or People’s Business and Economic Institute), they have built dozens of micro-hydro electric plants that brought more than 60 dark remote villages across Indonesia into the light.

Take for example Cinta Mekar’s plant. The small power plant which harnesses the current of the Ciasem River generates electricity of 120 kilowatts per hour (kWh). It is then sold to PLN (Perusahaan Listrik Negara, the state utility company) for Rp432 per kWh, a price that is even cheaper than the average production cost of PLN which is Rp1.000 per kWh. On average, the power plant earns about Rp26 million from each sale every month.

¹ *Literal meaning: blossoming love*

Aside from being cheaper in the production cost, the micro-hydro electric plant is also environmentally friendly since it does not need fossil fuels to power the plant. The electric hydropower plant, as how it is named, is powered by hydro power. It needs 1,100 liters of water per second to make 100 to 120 kilowatts per hour. Fortunately, the Ciasem's current flows at 1,500 liters of water per second, which is more than enough to turn the turbines.

Puni said that it is not easy to ask people to maintain the environment if there's no benefit. Thus, the development of micro hydropower plant can build up an environmental awareness among community. It should motivate the community to look after the water and rivers since they know that they can make electricity from the rivers.

Moreover, in addition to the electricity benefit, the people of Cinta Mekar have also gained from the plant's permanent concrete dam. The dam gives them greater control over the current, allowing them to irrigate much larger area than before. This has been a big improvement since the river, primarily used by the residents for irrigation, is infamous for its flash flood. The flood is known to occur six or seven times a year, destroying residents' bamboo irrigation dams every time. However, the plant did not need to build a huge dam. It only needs a small one to redirect half of the existing current to power the plant.



Figure 1: Dam, Diversion Weir and Intake

The Beginning

It all started in Appenzell, a great tourist destination located at the foot of the Alpstein ridges in the Swiss Alps. In summer 1996, Puni and her husband visited Switzerland for a business trip. When the couple was passing by a local wheat farm, they heard a loud noise coming from inside the farmer's warehouse. While Puni was wondering about the noise, she noticed that there were wires coming in and out of the warehouse. When she finally met the farmer, she asked him all the questions she had in mind. The farmer explained that the noise and the wires were from his micro-hydro power plant. In the summer, when the harvest time

had begun, the electric power was used to grind the wheat. “I sell the extra power to the Grid (National Energy Grid of Switzerland), the state electric company,” said the farmer. That short conversation then inspired her and gave her an idea. She thought that if the people in Switzerland could do it, Indonesians would be able to do it too.

While she was thinking about the new idea, Puni remembered vividly what happened five years before. Together with a group of farmers from Curugagung village, Subang Regency, West Java Province, she had successfully built a micro hydropower plant that generated electricity of 13 kWh. The small power plant brought the light into 121 households in the village. The initial capital of Rp44 million was mostly a bank loan; the farmers contributed a little, and the rest came from Puni’s foundation, IBEKA.

There they sold the electricity directly to the villagers for Rp300 per kWh. After deducting the operating expenses and the bank installments, the profit was then shared between the farmers and IBEKA. Unfortunately, after running for only four years, the state-owned and subsidized electricity company, the PLN, entered the village. Puni and the villagers were stunned when they heard about the news. Before they decided to build the power plant, they had been ensured that, the PLN would not be around for at least the next ten years. However, because the incumbent mayor of Subang Regency was running for his second term, he made the effort to pull PLN to the village as part of his political campaign. The problem was the price of PLN’s electricity was very low, being only Rp112 per kWh. “The huge amount of government subsidy, made the PLN’s rate was unbeatable,” Puni protested. In 2006, government subsidized PLN for Rp38 trillion.

The “CEO” of the village power plant, Subarnas, was shock and devastated. He feared that the village electric business would collapse, especially when he realized that he still needed to make payments to the bank for another two years. When the PLN’s electricity was finally established, 30 customers withdrew right away and switched to PLN; followed by many others later on. The local plant then had no choice other than matching the PLN’s price and forgot all about the profit. Subarnas could not take the burden. He had a heart attack and died a couple of weeks later. The bank loan was paid off by Puni’s family and friends who sympathized.

The death of the micro hydro power business “CEO” had left a deep pain in Puni, but, at the same time, it grew even bigger intention for her to find a way on how to make the PLN buys all the electricity generated by the community power plants. Her conversation with the farmer in Appenzell inspired her to make every effort to establish a similar scheme in Indonesia. She had learned in Switzerland that an off-grid/on-grid interconnection system was possible. She realized that the interconnection system would be crucial for a sustainable rural electricity movement. It would allow the community to sell their power supply to the PLN and gain income from the deal. Thus, for the following three years, she tirelessly approached the three successive energy ministers to allow small electricity producers to sell back into the grid.

In 1999, she finally succeeded in her effort to make an off-grid/on-grid interconnection system. She was able to connect the community-based off-grid system to PLN's grid. For the first time in the Indonesian history, the state power company, PLN, bought electricity from the community. Curugagung village was able to sell its power supply for Rp290 per kWh to the PLN. This price was only half of PLN's cost of production without subsidies. Nevertheless, from this system, the farmers of Curugagung gained profit of more than Rp2 million every month.

However, the agreement with PLN had a limitation. It was only applied to off-grid systems facilitated by IBEKA. Puni was not satisfied. She took one step further. She wanted a regulation that would apply for all. Puni's hardwork paid off. In 2002, following a lot of ceaseless lobbying, Puni successfully helped enacting a government degree on interconnection. The regulation made it mandatory for the PLN to buy electricity generated by all small-scale power plants. In 2004, the government enacted another degree which mandated the PLN to buy all medium-voltage co-generated power as well.

The success story of Curugagung intrigued other villages. They started to ask Puni to build them power plants as well. In an instant, Puni saw a vast opportunity for rural electrification throughout Indonesia. Under IBEKA, she decided to develop similar projects in many remote villages across the country. As a result, currently, there are more than 60 villages including Cinta Mekar that have been enjoying low-cost electricity.

The micro-hydro electric plants are making big differences in places like Curugagung, Cinta Mekar, and all other places in Indonesia. The power plants, which belong to the villages, have succeeded not only in providing electricity for their people, but also in generating extra funding for education and health care. The standard of living of the people in the villages was also improved. In Cinta Mekar, for example, every child can attend school up to middle school and every villager can get a basic health care for free.

Micro-hydro technology is not a rocket science. It is not even a new technology. It is simply a technology that Puni was able to transform into a source of income - capable of empowering the remote and poor villages. Puni's idea spread throughout the world in a flash. Several other countries like Philippine, Cameroon, and Nepal have been interested in adopting the system for the poor.

The power plant business: how does it work?

Puni and her husband believe that the key to bring about rural electrification is keeping the system community-based. Through IBEKA, they have developed a model of a community-based development in building micro hydropower plant. The model was developed based on the assumption that a community welfare, the goal in community development, can only be achieved by empowering the community through their participation in the project development. It follows the idea that community empowerment will increase local capacity. Increasing local capacity, however, must be followed by increasing local equity in order to make people to be the masters in their own home. It is highly important

that the community have equity in the community-based social business they built so that any benefits generated will go back to the community. This will also create the sense of belonging among the community. In fact, the sustainability of the project will depend heavily upon the community ownership of the system. Thus, participatory development needs local equity; and in order to gain community's participation, it is essential to respect local community. "We do this by honoring local wisdom," said Puni. People would be more likely to engage if they are respected.

Furthermore, community and rural developments certainly need not only financial capital but also human capital. When the government with limited resources has not yet been able to reach an area, a commercial investor can be invited as an alternative if the available local resources are very attractive in terms of measurable performance like profit, NPV, IRR, ROI, or ROE. The benefits from such investment, of course, will go primarily to the investor. The community welfare, if any, will then be limited and its sustainability is questionable since once the resources dry up, the commercial investor will leave to find new resources in other places.

However, in the community-based development model, the primary objective is to maximize community welfare and social transformation. These objectives can be accomplished only if the community participates in the process by creating social investment. This participatory development allows the community to have equity in funding the system, make decisions for its design and operation, and develop the rural programs that will benefit from the generated revenue. Profit from this revenue will be distributed back to the community to enhance the community welfare. The community welfare, among others, can be measured in terms of education, health care, and access to information. Improvement in the community welfare, in turn, will enhance not only local human capacity, but also local financing capacity.

Puni learned from her experiences that all of these endeavors can be made possible through the local cooperative mechanism. Through the establishment of a community union, many of the systems IBEKA helped construct are still up and running. Some are co-managed with private investors, while others have become fully owned by the community itself. Puni also applied a few principles to ensure the technical and social sustainability of the system. She empowered the community to be able to manage the system technically and financially. Long before the community gains any profits from the power system, Puni helped them plan the funding of the system, organize construction and maintenance, and set prioritized beneficiaries for the generated revenue.

In Cinta Mekar, for example, a public meeting was set to discuss and decide on how the community will use the money earned from their power plant business. The meeting identified the poorest group in the community. The people with no land, capital, employment, and education were set as priorities for assistance. After the micro-hydropower system had been built, the community began to receive a gross monthly income of approximately Rp31 million. This revenue was divided equally with the business partner after deducting the cost

of system operation and maintenance. The remaining funds were then used for scholarships, emergency health fund, health facility, and seed money for farmers. Villagers who need a loan can go to the community union with a letter of recommendation from their neighborhood head. The union offers programs such as savings and loans, health care and scholarships. They have helped installed electricity in 160 households that could not afford it. Since the establishment of the program in 2004, the union has loaned a total of Rp56 million for small enterprises in the village. Using the same model, Puni has now been able to facilitate more than 60 rural communities across Indonesia to gain access to and control of their electricity.

There are, however, more than 100 million of Indonesia's 230 million people still live in the dark. The hydropower resources potential of Indonesia is estimated to be of a 7.500 megawatt. However, so far, only about one percent is being utilized. The couple estimated that those small plants they had built provide electricity for nearly 400,000 people. "If we can increase the capacity of the micro-hydro electric power, there will be approximately 20 percent more people in Indonesia, especially in the rural area, that will be able to enjoy electricity." Said Puni.

Passion and commitment

Puni believes that in order for social businesses to be successful, the initiative should come from the individuals. She argues that it is the individual, not the organization, who has the passion, concept, and value that are required for formulating and implementing an idea. However, once an idea has been formulated, an organization is needed to involve other people. This is especially important during the implementation phase. Relying merely on an individual to do all the works can exhaust her or him even if all the activities came from a brilliant idea; and this will put the sustainability of those activities at stake. An organization, on the other hand, can provide supports in terms of resources and formal recognitions. However, if a social business starts from an organization, according to Puni, it will end up in never-ending discussions and arguments without clear idea ready to be implemented.

The passion, of course, needs to be shared with the entire member of organization to grow a collective passion. With a clear vision, a collective passion can bring synergy to achieve the goals of the organization. Without collective passion, it will be difficult to stay in an organization where the main goal is not a profit, but instead, community welfare through empowerment. Community empowerment becomes essential for the community to be placed as a subject in the rural development and to avoid other parties, like commercial investors, to take over the project which will eventually marginalize the community and put them just as an object. Moreover, empowerment can also encourage community to become more independent and more creative which will increase further productivity.

With passion and commitment, Puni and her husband have dedicated their life to bring about the change for rural communities. For Puni, her dedication to help marginalized groups had been nurtured since her childhood. Her mother always had the young Puni accompany her when she went to different villages to care for the sick. Their house was

always used as the center for a wide range of community activities; from literacy programs to primary health care services.

Puni spent some of her teenage years with the family of a former Minister of Internal Affairs, who had been the Governor of Central Java when the family adopted her. She was very much influenced by the family. She said that it was from them that she learned how to work directly with the poor people in rural areas. When she was asked why she chose to work with the poor, she said, “My parents taught me to work with the poor because there are many of them. They are also more willing to share, and most of all, God listens to their prayers.”

Her husband, Iskandar Kuntoaji, comes from a wealthy family. His father was the former Rector of Bandung Institute of Technology, and the former CEO of Bapindo (*Bank Pembangunan Indonesia* or Indonesian Development Bank). He himself is a geologist, graduated from Bandung Institute of Technology. He abandoned his wealthy life and promising career in one of the largest private group companies in Indonesia to work with community in rural areas. When he married Puni, it is as if they were made for each other. They complemented each other and shared the expertise in the technical, social, and economic aspects of the rural development.

As an engineer, Iskandar said that the technical aspect of every project they built was not that difficult. Based on the couple’s experiences, it only takes about 30 percent of the whole process of development. The most difficult but yet challenging part, that take the rest of the process, is to prepare the community until they are ready to accept the technology and even engage in the process. Iskandar does not want the projects failed like what happened with government-constructed micro hydropower plants. A lack of involvement from the communities made forty-five out of 56 government projects have failed and only 11 are partially successful. So, he does not want to come only to build the system. He comes when the need to have the system for the purpose of developing the community has grown in the community itself. That is when the community is ready to participate technically, financially, and most of all, socially. In fact, it is not Iskandar who will build the system. When the community is ready, they will build the system together.

Community preparation is Puni’s job. She is the one who has experiences and formal training in community development. She studied social science and economics when she went to Bogor Agricultural Institute. She further developed her experiences in these fields when she was given an opportunity by USAID to work with fish farmer families in North Sumatra during her final year of university. She went on to work for rural communities in an integrated rural women and environment program. When she graduated, she joined UNDP and became the manager of low-cost housing program for the poor urban. She later journeyed to Thailand, Africa and Latin America to learn about energy, sustainable development and environment as a Rockefeller Foundation fellow. In addition to her distinguished skill in communication, all of these experiences had helped her develop a clear understanding on how to create community-based models.

Now, electricity was increasingly in demand by people in remote areas. The more they build, the more people need the electricity. So Mumpuni and IBEKA are dreaming bigger. She dreams that one day when she comes to a village, any village in the country, she won't see any kids very tired at night trying to read their books with a very small light. It is this dream that keeps her doing the project. But, building a new power plant requires startup capital of about Rp2 Billion. Even for small, hydro-powered turbines that she wants to give away for free to remote villages, still costs around Rp1,5 Million to make. A question that has always been running around in her mind every time she is planning for a new project is where she is going to get the money.

Case Questions:

- 1) What drove Puni into the social business in the first place?
- 2) Why is she willing to dedicate her life and her family to the development of rural areas? Where do the passion and commitment come from?
- 3) Identify the elements of community-based development model she and her husband introduce!
- 4) Describe how the village utility business works operationally and financially? Where do you think the financial capital come from?