

Energising Development Indonesia (EnDev Indonesia)



Documentation of Productive Economic Development of MHP- Based Cooperatives

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Implemented by:



Documentation of Productive Economic Development of MHP- Based Cooperatives

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Abbreviation

| | |
|----------|---|
| BCD | Business Capacity Development |
| BPJS | <i>Badan Penyelenggara Jaminan Sosial</i> – the Social Security Organizing Agency |
| CEFE | Competency Based Economies Formation of Enterprise |
| DJEBTKE | <i>Direktorat Jenderal Energi Baru dan Terbarukan dan Konservasi Energi</i> - the Directorate General of New and Renewable Energy and Energy Conservation |
| ELC | Electronic Load Control |
| EnDev ID | Energising Development Indonesia |
| ESDM | <i>Kementerian Energi dan Sumber Daya Mineral</i> – the Ministry of Energy and Mineral Resources |
| GIZ | <i>Gesellschaft für Internationale Zusammenarbeit</i> |
| ICS | Internal Control System |
| ISRE | Institutional Strengthening for Renewable Energy |
| KK | <i>Kepala Keluarga</i> - Head of Household |
| KPI | Key Performance Indicator |
| KUKM | <i>Kementerian Koperasi dan Usaha Kecil dan Menengah</i> – the Ministry of Cooperatives and Small and Medium Enterprises |
| kWh | kilo Watt hour |
| NAD | Nangroe Aceh Darusalam |
| PLTMH | <i>Pembangkit Listrik Tenaga Mikro Hidro</i> - Micro Hydro Power Plant |
| PUE | Productive Use of Energy/Electricity |
| RE-Map | Rural Electrification Map |
| SAM | Support Activities for MHP |
| SMS | Short Messaging Service |
| SNI | <i>Standar Nasional Indonesia</i> - Indonesian National Standards |
| TOT | Training of Trainers |
| TPD | <i>Tim Pengelola Listrik Desa</i> - Village Electricity Management Team |
| UMKM | <i>Usaha Mikro, Kecil, dan Menengah</i> – Micro, Small and Medium Enterprises |



MHP NAD020 in Pidie, NAD,
managed by KSU Pakat Mandum

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The overflow channel of MHP SumBar 155 in South Solok, West Sumatera

Introduction

Deutsche Gesellschaft für Internationale Zusammenarbeit GmbH (GIZ) through EnDev Indonesia (EnDev ID) has been extensively supporting the development of micro hydro power plants (MHPs), which support the promotion of productive energy utilization through rural enterprises.

In 2013, the Ministry of Cooperatives and Small and Medium Enterprises (Min. of Cooperatives and SMEs) initiated the development program of 10 (ten) MHPs through cooperatives with the primary objective to operate productive business activities. The Min. of Cooperatives and SMEs program has a different approach than the off-grid rural electrification initiatives by other government institutions, by providing grants directly to local cooperatives. This addresses concerns about the sustainability of MHPs: the existence of the owners of the facilities (MHPs and business centers) that reap immediate benefits; and facilities that are now in the hands of a legal entity.

The most prominent objective of the Min. of Cooperatives and SMEs program is to empower local cooperatives to improve local productive economies through power generation facilities. In addition to being responsible for operations and management of MHPs, cooperatives will also run rural businesses by utilizing electricity generated by the MHPs.

In line with these objectives, GIZ cooperates with the Min. of Cooperatives and SMEs to support this initiative through **technical reviews** to ensure that the MHPs built meet the principles of good MHP development so that they can provide electricity as planned; as well as training on operation and management of an MHP for managers of MHPs. In addition, in the hope that productive activities will improve the sustainability of an MHP, **the entrepreneurial capacity building** of the boards and members of cooperatives is important, especially for those who have run a business. Therefore, a training that covers the business identification, marketing, human resources, investment and access to credit, bookkeeping and business planning topics is organized.



TECHNICAL REVIEW
Compatibility of components
Verification of performance
Quality of installation



MHP MANAGEMENT
Training for the TPD
KPI basic survey
Introduction of an SMS-gateway



ENTREPRENEURSHIP
Training on productive economic development

Support activities for SMEs programs



The atmosphere of the Beringin Cooperative shop
In Apui, Alor,
East Nusa Tenggara



Part One

A. MHP for Productive Economy

Renewable energy is a source of energy that is quickly restored naturally, and the process is sustainable. Renewable energy is produced from energy resources that will naturally not be depleted and even sustainable if properly managed.

Renewable energy is often referred to as sustainable energy, where water is one of them. This energy source is obtained by utilizing the potential energy and the kinetic energy to be converted into electricity. Hydro power plants are good for the environment because they do not produce greenhouse gas emissions.

All hydroelectric systems require running water sources, such as rivers or creeks. Unlike solar and wind power, water can generate power continuously for 24 hours every day.

Indonesian people have been using water energy on a small scale for a long time. Whether it is in the form of a simple waterwheel made of bamboo, as well as a turbine technology made of metal that has been the prima donna of rural electricity in the last 30 years.

The MHP development program developed by the Min. of Cooperatives and SMEs through cooperatives in various regions is expected to improve the local economy, either in the form of revenues derived from electricity tariffs or from the management of businesses that use electricity.

Although the power capacity of each unit is not too big, the existence of an MHP has been able to boost the economy of the community and members of the cooperative as a manager. Cooperatives are encouraged to develop a productive economy through the cooperatives' services based on renewable energy by increasing their role to become MHP managers. Of the few units already in operation, there are tariffs that vary according to the amount of electricity consumed.

B. Technical Review of MHPs

To ensure the sustainable supply of electricity of an MHP, an independent assessment and evaluation mechanism is needed for the MHP which is to be built. In the support initiative for the Min. of Cooperatives and SMEs, a technical review is carried out by three teams of MHP experts. These teams consist of MHP specialists experienced in MHP installation and have no conflict of interest in providing an objective evaluation of the system.

A total of ten MHPs are reviewed and evaluated, including an additional MHP in Tepal, Sumbawa, built in 2010 and handed over to the local cooperative. Whereas the MHP in Sintang, it could not be reviewed due to the uncertainties of the completion time of the construction of the MHP until the end of the contract period of these review teams.



The above map shows the locations of the MHPs currently listed on the EnDev ID (*Rural Electrification Map*, <http://remap-indonesia.org/>). The RE-Map is an initiative for the DGNREEC to record, collect, and share data on the locations of the off-grid energy system based on renewable energy.

EnDev ID has allocated a location code for each supported MHP, where it shows the district and the serial number in the EnDev ID database. Each of these unique location codes contains information about the GPS coordinates, the capacity, and the number of homes (HH, heads of households) connected. This coding system facilitates the monitoring process in the future.

List of MHP locations

| No | Location code | District | Village | Capacity (kW) | Location code |
|----|---------------|-------------------------|---------------|---------------|---------------|
| 1 | NAD020 | Pidie | Gajah Ayee | 35 | 150 |
| 2 | SumUt064 | Toba Samosir | Parsoburan | 40 | 98 |
| 3 | SumUt065 | Humbang Hasundutan | Sionom Hudon | 23 | 35 |
| 4 | SumBar155 | South Solok | Alam Pauh Duo | 50 | 165 |
| 5 | NTB001 | Sumbawa (Tepal 1, 2010) | Tepal | 25 | 279 |
| 6 | NTB002 | Sumbawa (Tepal 2, 2013) | Tepal | 40 | 73 |
| 7 | NTT002 | Alor | East Kelaisi | 62 | 102 |
| 8 | NTT003 | East Manggarai | Ranaloba | 60 | 134 |
| 9 | SulSel227 | Enrekang | Tallang Rilau | 40 | 80 |
| 10 | SulBar106 | Mamasa | Indobanua | 30 | 80 |
| 11 | KalBar001 | Sintang | Kapuas Hulu | NA | NA |

Indicators of electricity benefit receivers

Of **8** locations evaluated, the MHP provides electricity for:



837 HH, equivalent to about 3,760 people



25 public facilities, such as schools and houses of worship



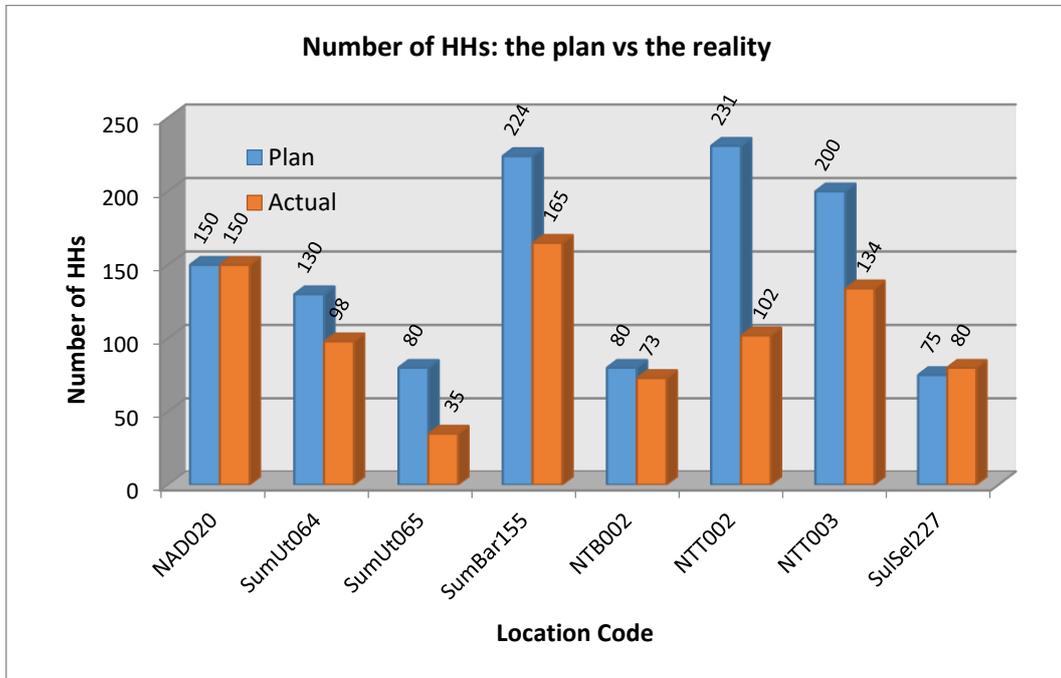
20 rural businesses, including stalls

Note:

NTB001, with 25kW capacity is connected to 279 HHs; while SulBar106, with a design capacity of 30kW, is expected to be connected to 80 HHs in the village.

Number of HHs connected

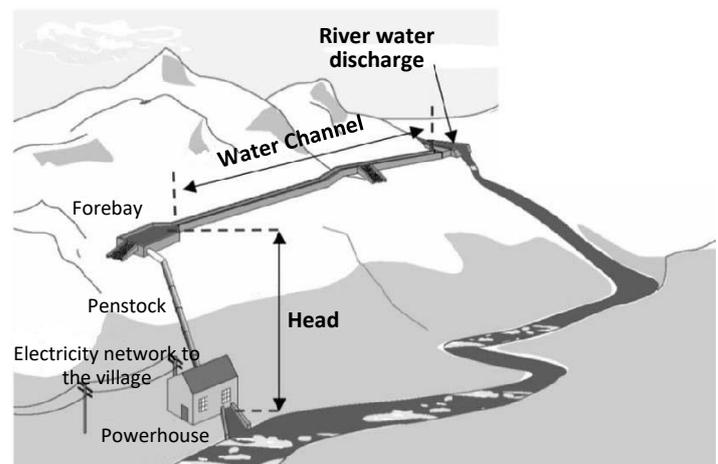
Of the eight MHPs analyzed, initially there were 1,180 HHs planned to be connected to the MHP network. However, according to the survey, only **837 HHs** are connected. On average, there is a difference of 43 HHs or about 29% between the plan and the reality. In general, these differences are acceptable in rural electrification programs, since the planned number of HHs is usually only estimation.



The Technical Review Process

In the technical review, all components of the MHP are inspected, from the upstream to the downstream, from the civil construction to the electrical components. The MHP system generally consists of four main components:

1. **Civil construction including:** the weir, the intake, the channel, the overflow channel, the forebay, the penstock, the powerhouse, and the tailrace.
2. **Mechanical components** including the turbine and its accessories.
3. **Electrical components** including the generator, the control system, the ELC, the ballast, and the cabling.
4. **Distribution network** including poles and cabling to the household network.



An MHP scheme in general



The Weir at MHP NTT003, District of East Manggarai

The EnDev ID commissioning procedure combined with the MHP technical review form is used for the technical inspection. This activity includes :

| No | Area | Description and objective |
|----|-----------------------------|---|
| 1 | Compatibility of components | Compare all installed components with the technical design. However, most specifications could not be found by the review team. |
| 2 | Verification of performance | On-site measurements of the performance of components: the head, the water discharge, the maximum power generation, the voltage generated, and the network voltage. |
| 3 | Installation quality | Assessing the quality of 18 components on whether or not they already followed best practices and safety requirements. |

The data from the field, supported by photographs, are then evaluated and the results are summarized in the MHP Technical Summary Sheet. Considering the existence of three review teams, an assessment calibration process is undertaken to avoid bias and to equalize the assessments, so that these assessments can be compared across locations.

The technical review analysis is based on the evaluation of eight MHPs. MHP NTB001 in Tepal was built in 2010, so it is not included in the Min. of Cooperatives and SMEs 2013 program. The review team arrived at MHP SulBar106 when the construction was not completed. Whereas the MHP KalBar001 was not reviewed because it has not been built until the final term of the review team work contract.



Sumbawa

GABUN

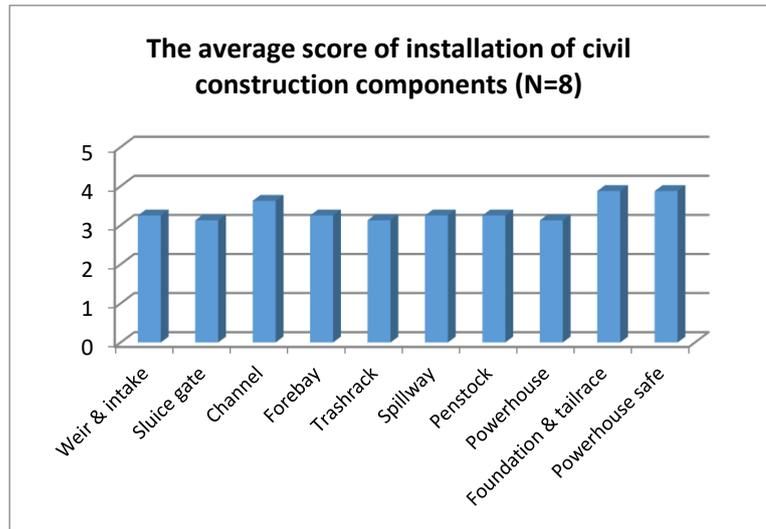
Conclusions of the Technical Review

The fundamental obstacle in this technical review is the unavailability of the contract design and specification documents. Hence, the examination of the conformity of components is based on best practices and fundamental requirements for an MHP to function.

Civil Construction

Civil construction is the largest part of the MHP scheme that requires detailed planning and persistence in the implementation in accordance with the design.

Installation quality is rated with a score of 1 to 5, in which 5 means the best quality and 1 means there is a risk to the safety. Based on the evaluation of eight MHPs, the civil construction is generally good with an average of 3.4 out of 5.

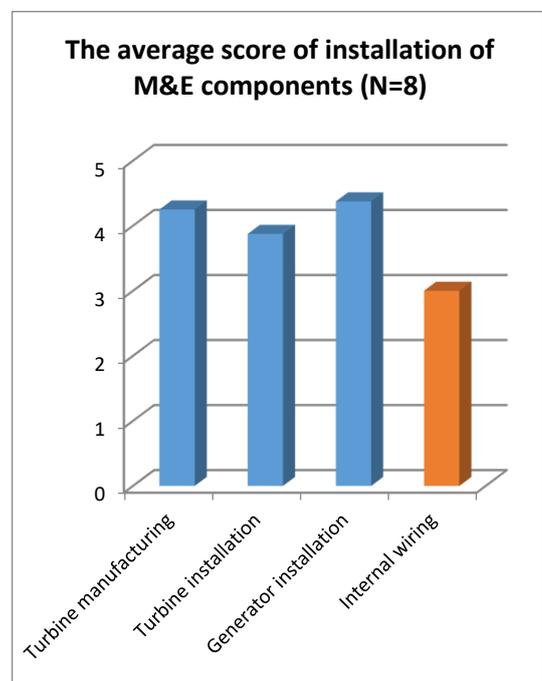


Mechanical and Electrical

In seven MHPs, the turbine used is the crossflow type, while one MHP, the SumUt065, it uses the propeller turbine. All turbines are manufactured by local manufacturers in Indonesia, where generally the manufacturing and installation is good and safe. All MHPs use the Marelli synchronous generator, and equipped with an ELC (electronic load control) and an hour-meter, except in the NTT002.

A common disadvantage related with electrical components is **the absence of a kWh meter** in some locations, whereas the kWh-meter is essential for monitoring the performance of the MHP. Only three locations have a kWh-meter installed in the powerhouse.

The scores for installation for mechanical and electrical components that include the turbine, generator, and the cabling in the powerhouse are relatively good. The lowest score is for the cabling in the powerhouse, including the placement of the ballast that sometimes less secure and without a protective cage.



The Distribution Network and the Household Installation

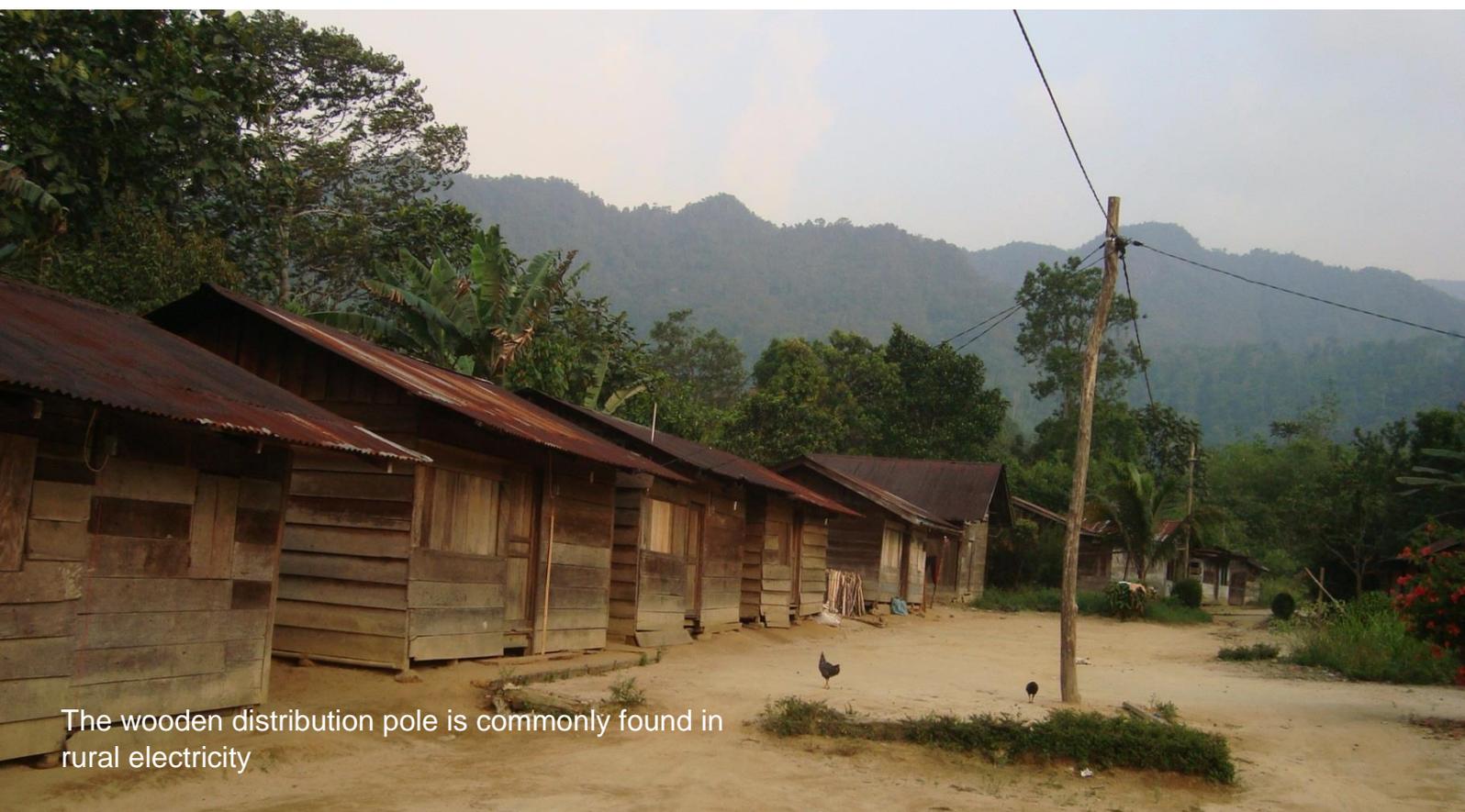
Wooden poles are still widely used for MHP distribution networks, usually due to the limited number of metal poles while the distance between the powerhouse and the village is far away. Such poles are commonly used in rural electricity, but they require treatment and may be more frequent replacements. In NTT002, for example, the entire distribution pole use wooden poles.

Another disadvantage related with household connections is that most of the 220V cable is not protected in the conduit. In addition, the grounding is also usually not installed, probably due to the factor that the contractor is focus the grounding only in the powerhouse area.

Performance of the MHP System

In an MHP system, the generated power is affected by the difference of the **head** and **flow** of water. The performance of an MHP is reflected in the maximum capacity achieved during the testing. However, there are several aspects to consider when analyzing why an MHP did not work as expected, among others:

- **Season and weather**; on some occasions, a lesser amount of water discharge could be due to the low intensity of rain in certain months.
- **Topographic difficulties**; it is already familiar that the contour of rocky soil may lead to changes in the location of civil work components such as the weir and the channel. This kind of shift can affect the head, which will ultimately affect the generated power.
- Beyond natural factors, i.e., **poor installation**; that includes poor concrete work, leaks, and sedimentation that could affect the power generation.



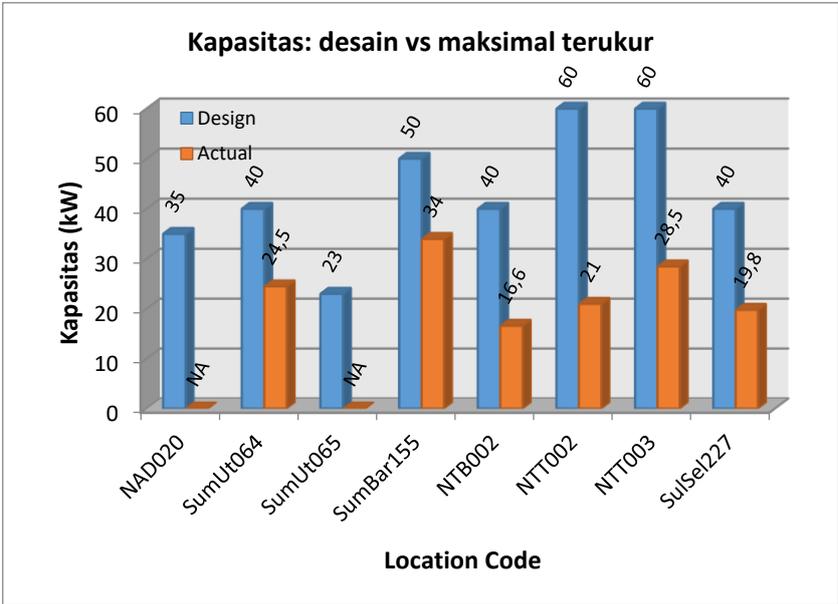
The wooden distribution pole is commonly found in rural electricity

The **head** is highly dependent on nature (the condition of location). A good contractor will do its best to follow the technical design to get the desired head. This means that the pre-construction phase, including feasibility studies and site verification, is essential to produce an accurate proposal. **Water discharge** is generally out of the contractor’s control unless there are significant errors made in the design or construction of the intake, the channel and the forebay.

In the end, a good MHP construction target is to achieve the maximum power capacity (closest to design). The ratio of the actual MHP output power to the design capacity is shown in the following table:

The ratio between the design power and the actual output power

| Location code | NAD020 | SumUt064 | SumUt065 | SumBar155 | NTB002 | NTT002 | NTT003 | SulSel227 |
|---------------|--------|----------|----------|-----------|--------|--------|--------|-----------|
| Ratio | NA | 61% | NA | 68% | 42% | 35% | 48% | 50% |



Of eight locations evaluated, only six locations of which the power could be tested, with an average power ratio of 50%.

Further explanations of the performance and conditions of each location are described in more detail in the Technical Summary Sheet submitted to the Min. of CSME confidentially.

C. Technical Recommendations

Ideally, an MHP technical review requires preliminary information in the form of technical design and specifications. In the case of the Min. of CSME program, the document is not easily obtained by the review team, so that it raises doubts in the evaluation process. Therefore, the review team should coordinate with the Min. of CSME to get the technical documents before departing to the location.

Every MHP installation is unique. In general, variations occur partly due to the performance of the contractor and partly due to natural conditions. Realizing this uniqueness, to draw a generic conclusion about the installation of an MHP means to underestimate the complexity of this power generation scheme. Therefore, the deepening of the analysis needs to be done specifically for each location.

For the next MHP development, it is strongly recommended to install a kWh-meter and an hour-meter at least at the powerhouse. These devices are very important for monitoring purposes, either by the TPD or by the relevant authorities.

Disseminating the technical review activities on an MHP by EnDev ID to beneficiary cooperatives will help MHP developers to know how their work will be valued and evaluated. Better methodologies and standardized assessment are required in the subsequent technical review activities.

In order to promote integrated and coordinated rural electrification, it is important to deliver the information of locations of MHPs and several lessons learned from the Min. of CSME program to the DGNREEC as the focal point of the renewable energy-based rural electrification.



An MHP in Solok, West Sumatra (SumBar155) managed by KSU Sinar Mas



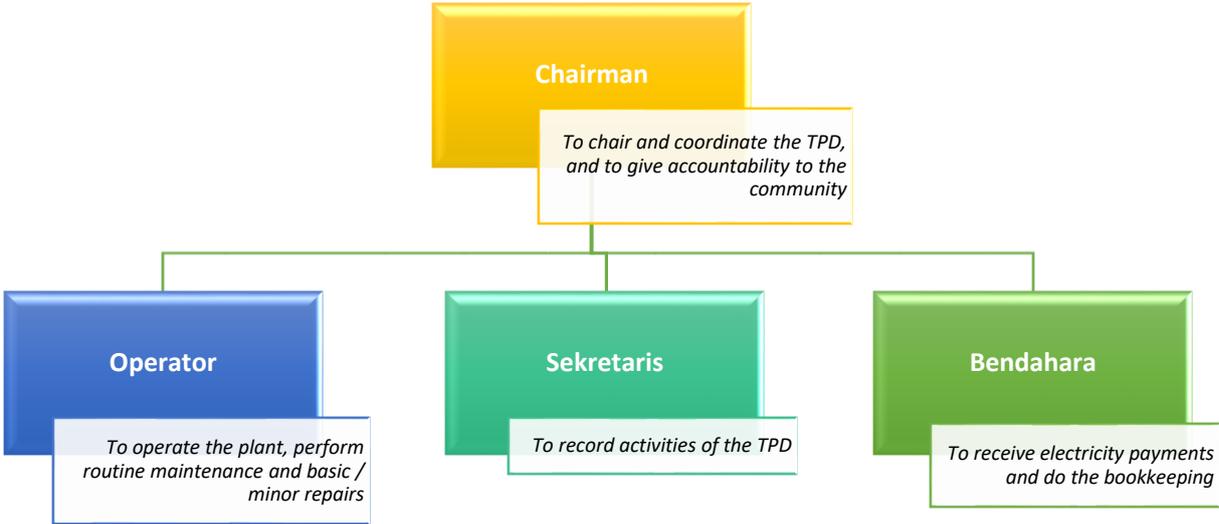
Part Two

D. Village Electricity Management Team (TPD - *Tim Pengelola Listrik Desa*)

The village electricity management team or abbreviated as the TPD (*Tim Pengelola Listrik Desa*) is a community organization responsible for operating and managing an MHP. The TPD usually consists of operator/s, a secretary, a treasurer, and led by a chairman.

A simple TPD structure is shown in the following diagram with a brief description of the function of each position. In small organizations, the functions of secretary and treasurer can be carried out by only one person, preferably a woman, with bookkeeping experience.

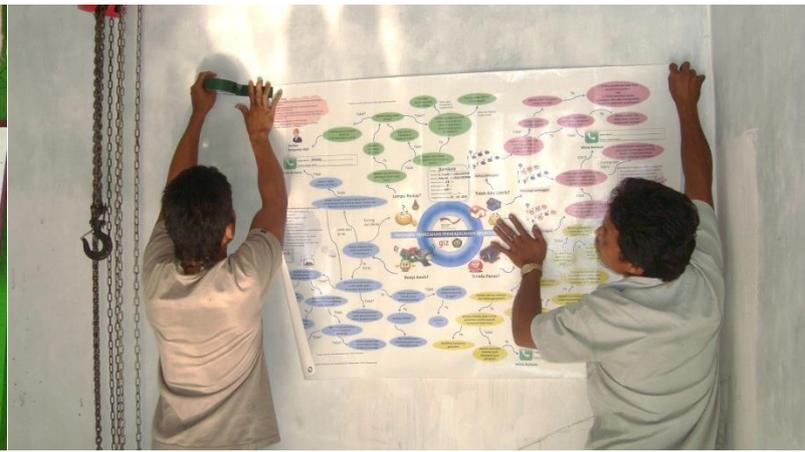
TPD is ideally selected unanimously in a meeting involving all members of the community. This is to increase the people's trust in the implementation of the responsibility for the management of the MHP which concerns the interests of the people.



E. Training on MHP Operation and Management

As part of a series of EnDev ID support activities to the Min. of CSME Program, there is a TPD training component to improve the capacity of MHP managers conducted on site. This TPD training includes both theoretical and practical operator training and the management training that includes the introduction of administrative books, and usually, at night time, there is also dissemination of MHP and the use of electricity in general to the community.





The documentation photos on this page tell stories about activities related to the capacity building of the TPD as provisions to manage the MHP. At the top left corner, the board is installing a TPD Poster and a Poster of Watershed Management on the outside wall of the cooperative office. At the top right corner, the operator is installing a Poster of the MHP Problem Solving at the powerhouse. This poster will help the operator to solve minor problems that may occur when operating the MHP. The photo at the bottom left shows the atmosphere of the operator's practice training, where the trainer is explaining the components in the control panel. At the bottom right is the practice training related to the power plant administration, including the introduction of supporting books such as customer logbooks and cash books.



Part Three

F. Micro, Small and Medium Enterprises

Micro, small and medium enterprises (MSMEs) are business activities capable of expanding employment and providing widespread economic services to the community. SMEs also play a role in the equalization process and improving people's income, as well as enhancing economic growth. In addition, MSMEs are one of the main pillars of the national economy which must have the ultimate opportunity, support, protection and broadest development as a manifestation of assertive alignments to the group of

people's economy. Although MSMEs have demonstrated their role in the national economy, the sector still encounters various constraints and constraints, both internal and external, in terms of production and processing, marketing, human resources, design and technology, capital, and the business climate.

G. Training on Entrepreneurship

As one of the measures to increase the opportunities, capabilities and protection of MSMEs, EnDev ID also provides support in the form of entrepreneurship training with the theme “Training on Capacity Building for Business Actors of MHP Management Cooperatives” implemented in 10 cooperative managers of MHP in 2014.

This training, among others, aims to improve the capacity of business actors, especially on the principles of entrepreneurship, the principles of rural business, investment, market assessment, financial and accounting aspects, and the forms of organizations.

The Training Method

The training employed the **CEFE Business Canvas Model**¹ method, which is a method that changes the concept of a complex business model into a simple one. With this method, the business model is displayed on a single sheet of canvas, which contains a map of the potential and growth plan of MSMEs in four aspects of management:

- the marketing aspect

¹ <http://www.cefe.net/>

- the production aspect
- the human resources and organization aspect
- the financial aspect

so as to encourage the participants to as much as possible make a measurable business development plan.

This training method is also designed as an “**adult learning**” method, where there are lectures on speaking, discussions, field studies, and problem solving proportionally, and the participants will participate as part of the training. In addition, in order to achieve a dynamic situation, there is also an “energizer” (games) to increase the enthusiasm of the participants.

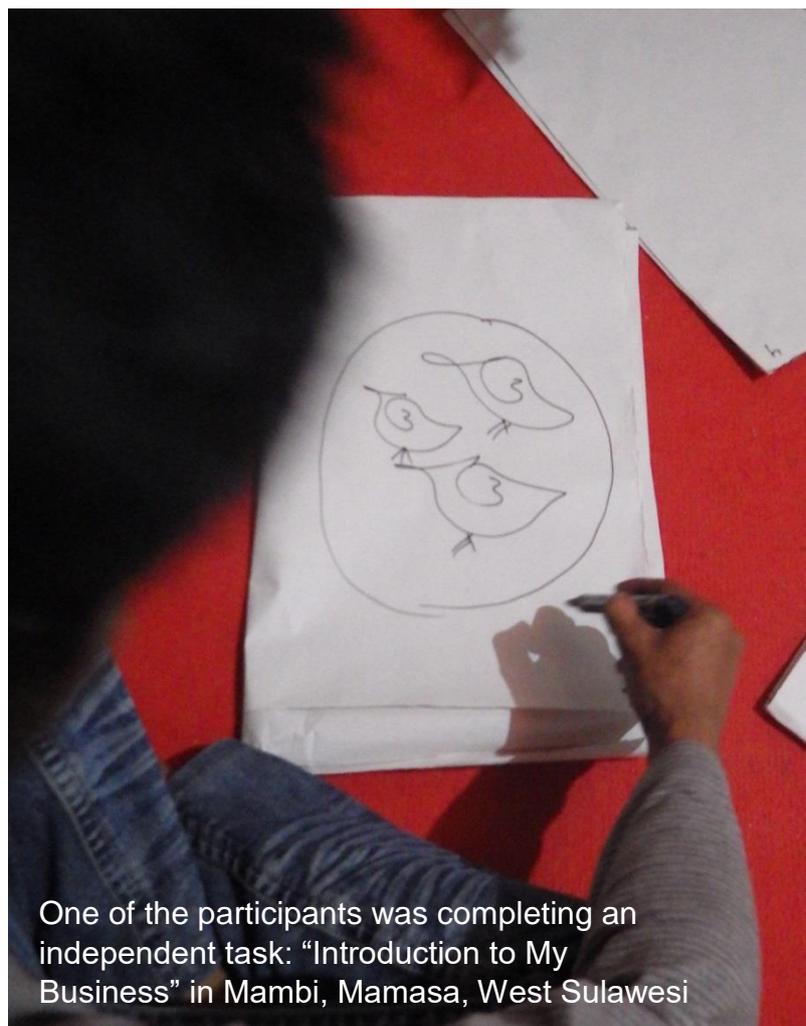
Each of the training is facilitated by a professional trainer supported by local facilitators of the selected participants. Five participants were selected to form a peer group. The participants share common responsibilities to achieve the success in group and measurable.

The facilitator facilitates the “**learning cycle through experience**”, i.e., the participant-based learning model. This cycle is a series of phases of activities organized in a certain way so that the participants can master the competence in a fast and simple way.

For the training participants, the implementation of this method can improve the motivation of the learning process, because the participants are actively involved in the learning / training process. It will also be helpful in developing an active and creative attitude for the participants to become more meaningful in their business development.

Phases of the training

- Phase 1 Delivery of **information about training** to potential participants. At this phase, the potential participants will be notified of the purpose and contents of the training, as well as when and where the training will be held.
- Phase 2 **Pre-training assignments.** At the beginning of the training, each participant should make a comprehensive summary of his/her business ideas and conditions.
- Phase 3 **Selection of participants.** The local training partner cooperative will create a list of selected participants who are eligible for the training. The selection process will be done based on the specified requirements.



One of the participants was completing an independent task: “Introduction to My Business” in Mambi, Mamasa, West Sulawesi

- Phase 4 **Topic 1 of the training:** the capacity building for cooperation, and the development of small and medium enterprises in rural areas
- Phase 5 **Topic 2 of the training:** the development of business plans. All participants will spend three days to create business plans for their ideas using the example (template) of a systematic business provided by the training committee.
- Phase 6 **Coaching.** There are local trainers or facilitators selected from the participants who are assigned to monitor the participant's business plan for the first year.
- Phase 7 **Monitoring and evaluation.** The training committee will measure and assess the capacity improvements gained by all participants using several specified criteria.



Training on Entrepreneurship
in Apui, Alor, East Nusa

The monitoring plan

After the end of the training, once in every three months for a period of one year, the trainer and/or with the local facilitator are tasked with monitoring the business development plan of all participants who have entered into an agreement to enforce the business capacity improvement in a measurable manner in accordance with the following criteria:

1. Increased income
 - a) For own companies, the turnover increased by at least 10% every three months
 - b) For households, able to keep at least 5% of their monthly needs on a regular basis
2. Adding new customers
 - a) To add at least 20% for businesses with maximum 5 customers
 - b) To add at least 10% for businesses with maximum 10 customers
 - c) To add at least 5% for businesses with maximum 20 customers
3. Increase revenue for cooperation works of at least 10%

The arrangement and fulfillment of the above criteria are the training objectives that provide essential basic knowledge and skills to develop small and medium enterprises in rural areas.



The participants were completing the individual task of “Knowing Me Knowing You” in Ruteng, East Manggarai, East Nusa Tenggara

Summary of Implementation

Training on entrepreneurship was held at all the MHP-beneficiary cooperatives in 2013. The training was held from May 2014 to August 2014. The total number of participants attending the full training program was **146 people**. Sometimes there were some participants who cannot attend the entire training program due to the work that cannot be left behind. The involvement of female participants in the training has been represented with the lowest rate of 9% in Pidie, Nangroe Aceh Darussalam, up to 62% in South Solok, West Sumatra.

| No | Location | Date of Implementation | Number of Participants | | |
|----|------------------------|------------------------|------------------------|-------|-------|
| | | | Day 1 | Day 2 | Day 3 |
| 1 | Alor, NTT002 | May 7-9, 2014 | 11 | 9 | 8 |
| 2 | East Manggarai, NTT003 | May 7-9, 2014 | 32 | 27 | 27 |
| 3 | Pidie, NAD020 | May 14-16, 2014 | 11 | 11 | 11 |

| | | | | | |
|----|------------------------|--------------------|------------|------------|------------|
| 4 | Mambi, SulBar106 | May 21-23, 2014 | 24 | 24 | 24 |
| 5 | Enrekang, SulSel227 | May 21-23, 2014 | 11 | 11 | 11 |
| 6 | South Solok, SumBar155 | June 10-12, 2014 | 21 | 13 | 13 |
| 7 | Toba Samosir, SumUt064 | June 16-18, 2014 | 11 | 11 | 11 |
| 8 | Humbang, SumUt065 | June 16-18, 2014 | 17 | 15 | 15 |
| 9 | Sintang, KalBar001 | August 12-14, 2014 | 13 | 15 | 15 |
| 10 | Sumbawa, NTB002 | August 19-21, 2014 | 17 | 12 | 11 |
| | | | 168 | 148 | 146 |

In group work and individual work discussions, the participants had been able to create a **Potential and Business Development Map** based on their respective plans and locations. Based on the business conditions data, the participants created a business plan development by making projections for every three months in the subsequent year, with the increased turnover in average between the lowest at 30% in Humbang Hasundutan, North Sumatra and the highest at 135% in Alor, East Nusa Tenggara.

The targeted increase in turnover in the projection was made by all participants by way of re-designing their business plan. All participants re-designed the target on marketing, promotions, and the joint marketing facilitated by local cooperatives, and subsequently, enhancement of quality production, enhancement of the competence of human resources and sound financial records.



The participants' optimism



H. MHP Supports Local Economic Growth

The main purpose of MHP development through the Min. of CSME program is to enhance local economic growth. Electricity generated by MHPs is expected to be utilized for productive activities rather than the consumptive household use only.

In the training on entrepreneurship which was attended by cooperative managers and business owners (who are members of a cooperative), a mapping of local strategic potential was prepared by the participants of which the conclusion is presented in the following table.

Mapping of the Strategic Local Potential

| District | Agricultural Sector | | | | | Services Sector | Production Sector | Trading Sector |
|----------------|---------------------|--------|-----------|--------|--------|-----------------|-------------------|----------------|
| | Cacao | Coffee | Candlenut | Banana | Chilli | Services | Wooden Furniture | Trading |
| Alor | | | 80% | | | | | |
| East Manggarai | 67% | | | | | | | |
| Mamasa | | 67% | | | | | | |
| Enrekang | | 100% | | | | | | |
| Sumbawa | | 45% | | | | | | |
| Pidie | | | | | 100% | | | |
| South Solok | | | | | | 35% | 25% | |
| Tobasa | | | | | | 36% | 45% | |
| Humbang | | | | | 47% | | | |
| Sintang | | | | | | | | 33% |

Source: Processed Training Summary Data

Most of the participants were SMEs in agriculture sector, with the biggest local potential of coffee followed by cacao, candlenut and banana as well as chili commodities. In addition to the agricultural sector, the next strategic local potential is in the services sector, the production sector (wooden furniture), and the trading sector. MHP cooperative managers and training participants also made a **Map of SMEs Electricity Supply** using electricity supply from MHP.

The Map of SMEs Electricity Supply is a simple information related to the concept of 5W + 1H i.e., what



Mapping of the Strategic Local Potential in Sionom, Humbang Hasundutan, North Sumatra

is the business, where and how far the workshop is, why does it use MHP electricity supply, when to use the electricity, who owns the business and how to optimize the capacity of the existing electricity supply.

I. The Value Chain Re-Design of Potential Seeded Commodities

The simple value chain concept provides an understanding of the value chain as a combination of nine general value-adding operations in a production process up to the product marketing. The main focus in the value chain lies in the added benefit to consumers, the value-added interdependent process, and the resulting demand as well as the cash flow created.²

The Agricultural Sector

According to the results of strategic local potential mapping, there are commodities of coffee, candlenut, banana, cacao, and chili. The coffee commodity becomes one of the potential **seeded commodities** in villages where an MHP is built. **Indonesia's best coffee** products are known to come

² Michael E. Porter, 'Competitive Advantage, Creating and Sustaining Superior Performance' 1985

from several training locations, with different variants depending on the variety of land used for cultivation. The locations of the best coffee producers of Indonesia are:

1. Tepal Village, Sub-Dist. of Bantulanteh, Dist. of Sumbawa, West Nusa Tenggara
2. Indobanua Village, Sub-Dist. of Mambi, Dist. of Mamasa, West Sulawesi
3. Tallang Rilau Village, Sub-Dist. of Bungin, Dist. of Enrekang, South Sulawesi
4. East Kelaisi Village, Sub-Dist. of South Alor, Dist. of Alor, East Nusa Tenggara
5. Ranaloba Village, Sub-Dist. of Borong, Dist. of East Manggarai, East Nusa Tenggara

The delicacy of high quality coffee in the training location is no doubt, just mention Arabica and Robusta coffee from Tepal Village that has been stated to consistently fulfill the requirements of SNI 6729-2010 and the Internal Control System (ICS) document. Coffee of Tepal has a softer aroma, which is different from the type of Indobanua coffee which is usually slightly thicker.

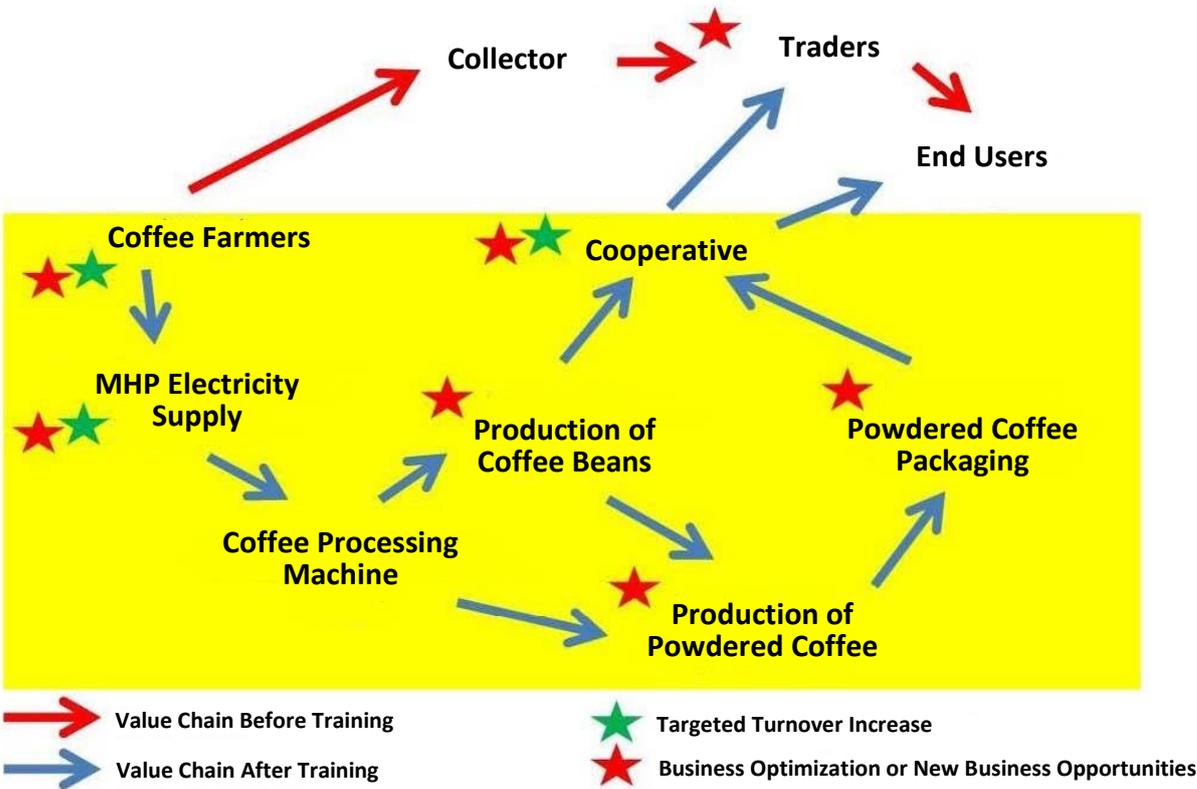
Utilization of MHP electricity supply to the plantation and agriculture sectors, among others is used for the **operation of grinding machines** or processors that can add value from coffee beans to coffee powder and machines that process chili into processed chili products.

Value addition of a product after the value chain re-design is applicable to all commodities in other agricultural sectors. The definition of added value is the increase of the value of a product through processing, transportation or storage in a production process. The added value is the difference between the value of the product and the value of the input cost, excluding the labor wage.³

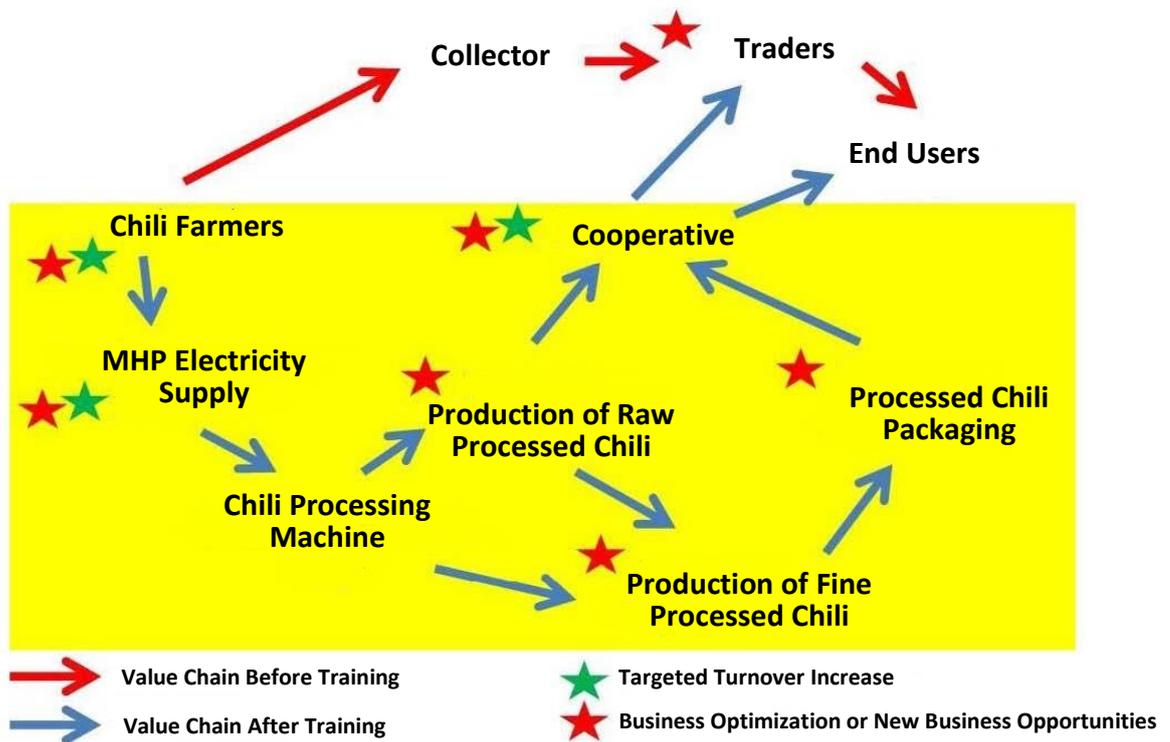
³ <http://www.kemenkeu.go.id/Kajian/kajian-nilai-tambah-produk-pertanian>

The Product Value Chain Re-Design conducted by the training participants for coffee and chili commodities are as follows:

The Coffee Product Value Chain Map



The Chilli Product Value Chain Map



Through the mapping and re-design activities, cooperatives and members who are also MSME players can optimize their business and may take the opportunity to undertake a new type of business. The new value-added chain shows new business opportunities that, if taken seriously, will significantly add value to a product and ultimately have an impact on increasing the income of MSMEs.



The atmosphere of preparation of electrical installation of a coffee grinding machine in Beringin Cooperative, in Alor, East Nusa Tenggara (above) and the grinding process of coffee beans in Tepal, Sumbawa, West Nusa Tenggara (below)



Production Sector

Production, in terms of economic, is a human effort to create or add to an item in order to meet his/her own needs or the needs of others. Judging from the interests of producers, the objective of production is to produce goods to gain profit. The objective is achieved if the goods or services produced is in accordance with the needs of the community.

The production function is an equation that shows the relationship between the output level and the level of input use. **The furniture production** is one of the potential commodities in:

1. Napajoring Village, Sub-Dist. of Habinsaran, Dist. of Toba Samosir, North Sumatra
2. Alam Pauh Duo Village, Sub-Dist. of Pauh Duo, Dist. of Solok Selatan, West Sumatra

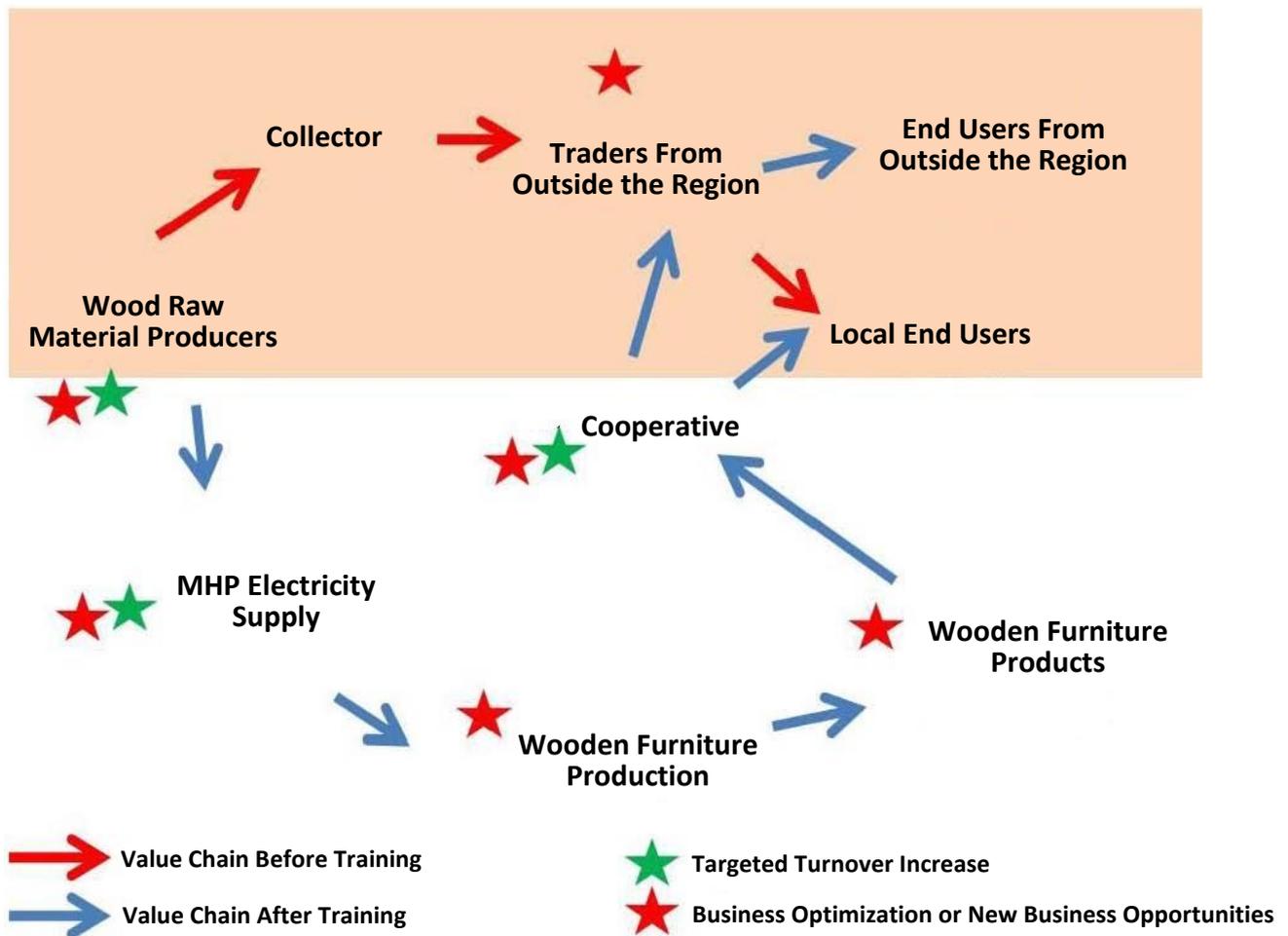
Furniture is a term used for household furniture that serves as a place to store goods, seating, beds, place to do something in the form of a table or place to put goods on the surface. Furniture as a storage place is usually equipped with doors, drawers and shelves, wardrobe, bookcases and others.

Furniture can be made of wood, bamboo, metal, plastic and so forth. Wooden furniture as an artistic product is usually made of choice wood with beautiful colors and textures done with a smooth finishing.



The atmosphere of one of the workshops of the wooden furniture production sector that uses MHP electricity supply in South Solok

The Wooden Furniture Product Value Chain Map



The utilization of MHP electricity supply in the production sector is used for the operation of all power tools, such as drilling machine, planer, sawing machine, wooden router machine and sander machine.

All of these power tools will help the performance of wooden furniture SMEs to become faster and maximum while reducing production costs, so that the added value of wooden furniture products increases. In addition to providing quality products for consumers with competitive prices, this business is also expected to create new markets for consumers outside the region.

The price of the product becomes competitive because in addition to save the transportation cost the actors of SMEs are also able to make better products in a faster production time. This will impact the growth of the business both for wooden furniture SMEs business actors and cooperatives.

Trading Sector

Trading or exchange in economics is defined as a process of exchange based on voluntary will. Each party has the freedom to determine the expected benefit of such an exchange activity according to their respective interests before deciding whether to make an exchange or not. The benefit or profit is the reason (motive) why people want to exchange or trade. Such benefits in economics are called trade benefits or “gains from trade”.



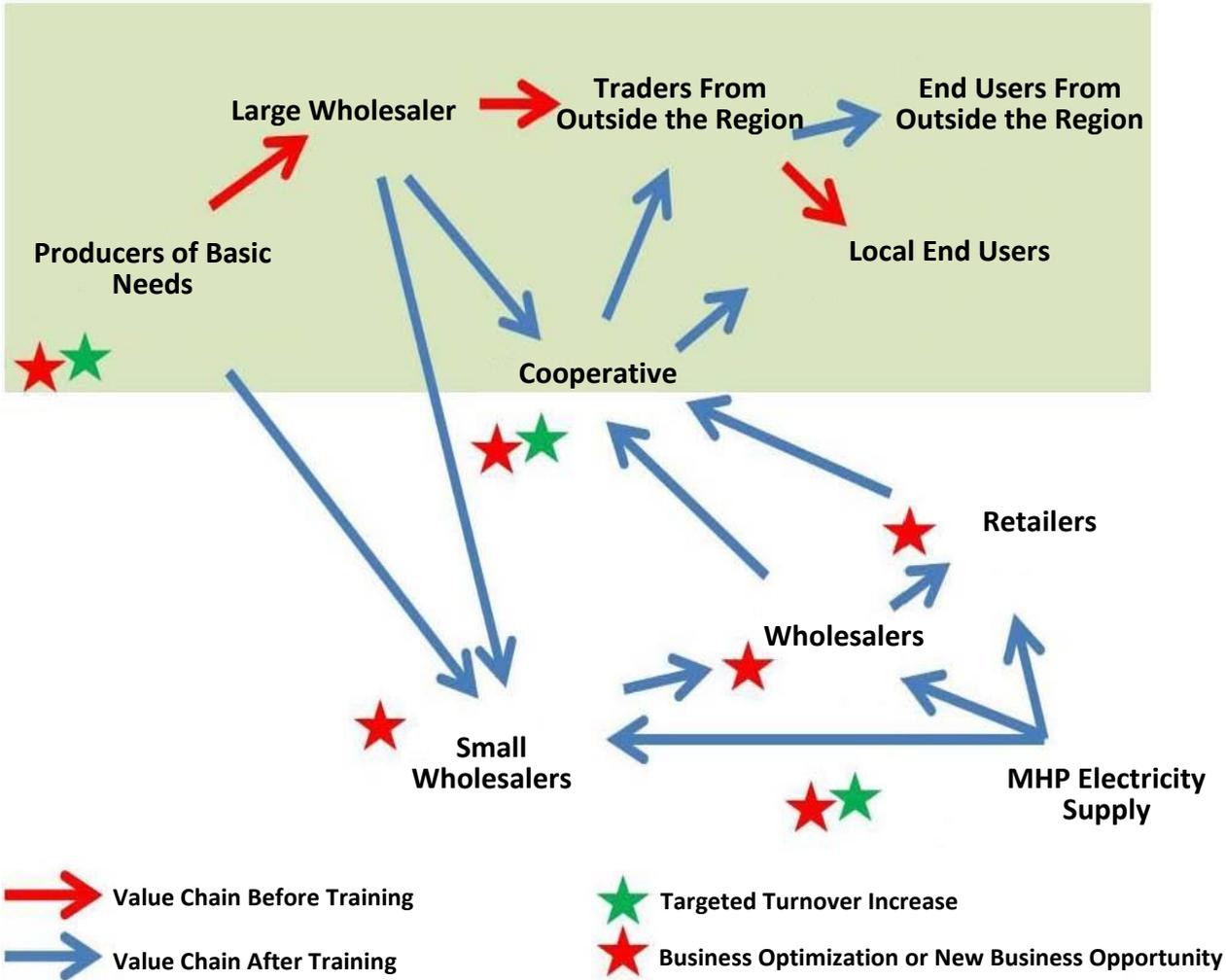
Actors of trading activities are known as **traders** who are the spearheads of economic actors who directly deal with consumers. The more advanced an area, the greater number of and more various economic actors, especially traders. A trader in economics is a person or a business entity that undertakes the sale and purchase of goods and services independently.

In general, traders are divided into:

1. **Wholesalers** are traders who buy goods in wholesale to be retailed to consumers or small traders. Wholesalers can also buy by means of collecting from small traders to be sold in large parties.
2. **Small traders (retailers)** are traders who buy goods from wholesalers to be retailed to consumers. Small traders can also buy goods from the producers and then sold them to consumers.

The role of trading in a region is very important. This trading sector became one of the excellent potentials in Kapuas Kanan Hulu Village, in Sintang District, West Kalimantan. The mapping of the trade value chain in Kapuas Kanan Hulu village is shown in the following figure.

The Trading Value Chain Map



Utilization of MHP electricity supply is used to support the business, for example for freezers that will make merchandises are always fresh. Expected impacts in trading are better quality, specialized variants (specialization), and competitive prices.

Services Sector

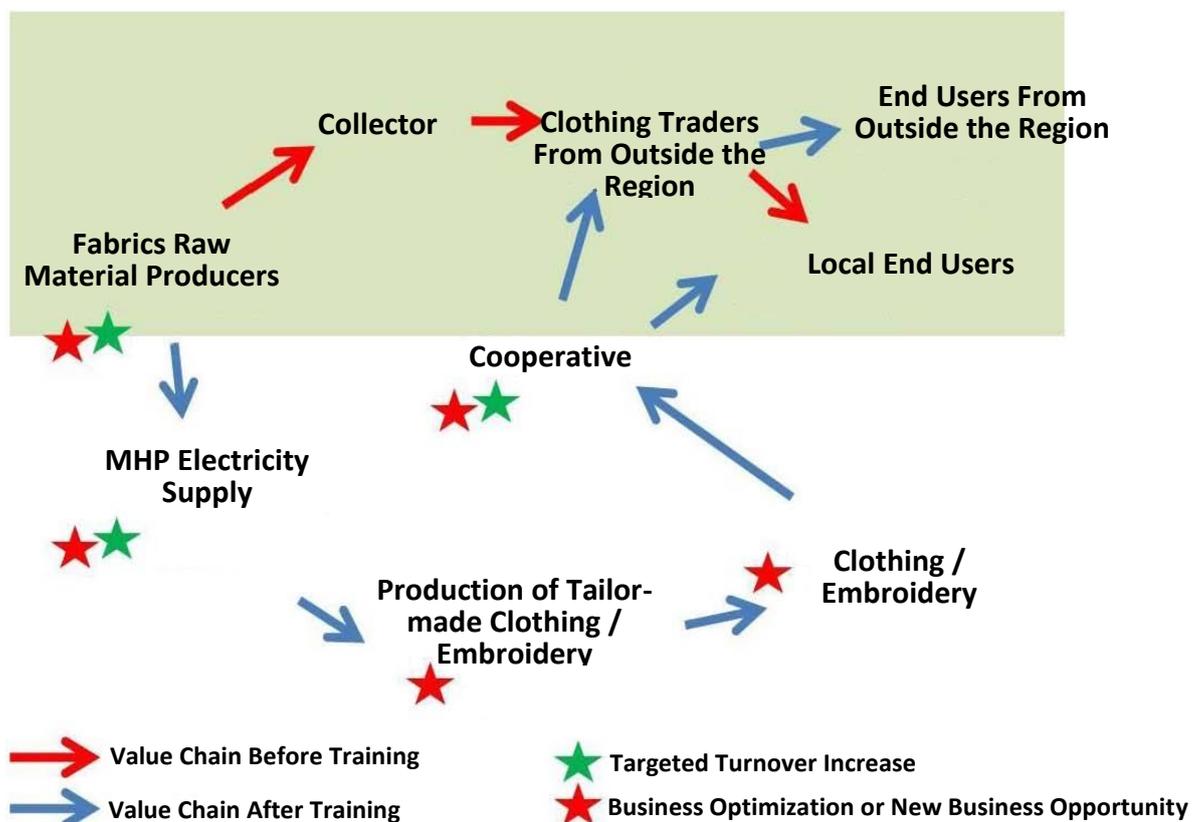
The **services sector** or **service industry** is known as the tertiary economic sector, where the secondary sector is the production business (manufacturing), while the primary sector includes mining, agriculture, and fisheries. There is also an additional sector called the “quaternary sector”, which is defined as sharing information normally owned by the tertiary sector.

The ever increasing services business sector focuses on the idea of knowledge economy by understanding what consumers want and how to deliver it quickly and efficiently. The services sector is one of the seeded potentials in:

1. Indobanua Village, Sub-Dist. of Mambi, Dist. of Mamasa, West Sulawesi
2. Alam Pauh Duo Village, Sub-Dist. of Pauh Duo, Dist. of South Solok, West Sumatra

Clothing is one of the basic needs as a social being, in which one's judgment of others is sometimes judged by the appearance or manner of dressing. Therefore, clothing, that is considered a personal identity, can be a business opportunity and a focus of SMEs in the services sector. For MSMEs in the services sector, the utilization of MHP electricity supply is used to operate electric sewing machines and electric embroidery machines.

The Value Chain Map of Tailoring and Embroidery Services





The tailoring service sector users of MHP electricity supply in Indobanua Cooperative, Mambi, West Sulawesi

By using electric sewing and embroidery machines, clothing products become more qualified, transportation costs are lower, and the production time is faster, so the price is competitive. The expected impacts for SMEs of the services sector and cooperatives by creating a new value chain is that in addition to increase turnover, they also are able to compete with competing products measurably.

J. Lessons Learned from the Training on Entrepreneurship

For the participants

Using the CEFE Business Canvas Model method, the participants can experience a business process directly, able to create a map of potential and business improvement opportunities in a short time, both individually and in a group as members of a cooperative. In addition, the participants gain experience directly on the meaning of the achievement of targets in the business, i.e., improvement in four aspects of management (marketing, production, human and resources and organization, and finance) and make it as a learning for members of cooperatives who have not been involved in the training.



The handing over of BPJS Card to PLTMH operator shortly after the opening of the entrepreneurship training in Alam Pauh Duo Village, District of Solok Selatan

For cooperatives

Cooperatives, as a local partner of training implementation, in addition to gaining experience as a training provider (with involvement from the participant selection process to final evaluation), also benefited to disseminate it to the members and the communities to utilize energy from MHP as a means of increasing their business.

For the trainers

Trainers were professionally aware that the conditions occurring in the field are sometimes not in accordance with the plans, so the trainer performed different approach strategies so that the participants understand the meaning and the series of the training process and take the benefits to be implemented in their business development. The different conditions to include the reluctance of the

participants when they are required to pay the “*commitment fee*” (the plan was Rp 50,000.00 per person) before the training begins. The trainer changed the strategy in the form of a sanction for any violation in the form of paying the amount of money as agreed upon in the learning contract, starting from the lowest at Rp 1,000.00 in Mamasa, West Sulawesi to the highest at Rp 5,000.00 in Sintang, West Kalimantan, for participants who violate the class’ rules.

For SMEs and GIZ

The business development training given to business actors and members of cooperative management received excellent response from the participants. All this time GIZ through the EnDev ID program focuses its capacity building activities limited to the management of PLTMH. Considering the importance of entrepreneurship in the utilization of electricity for productive activities and the limited resources of GIZ for similar activities in the future, GIZ along with the Min. of CSME need to develop cooperation with other organizations to be able to support the business training on a wider scale.

Pasar mana?
berapa jarak tempuh?

2). Aspek (Bagian) pemasaran = Kami memasarkan di beberapa pasar

Beberapa?
jumlah..
nya.

berapa jumlah keuntungan yg diharapkan

Berapa Keuntungan yang diharapkan

(Bagian) Produksi : Kami

Berapa jumlah kendaraan?

Rencana nya?

organisasi = Membentuk beberapa-
komponen dan m... perencana yg tepat

Berapa jumlah masyarakat

Pesaing

Rencana nya?



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Program Energi Terbarukan Indonesia/ASEAN memegang peranan penting dalam memberdayakan pelaku lokal untuk mengadopsi solusi energi terbarukan demi kepentingan masyarakat

 The Renewable Energy Program Indonesia/ASEAN plays a prominent role in enabling local actors to adopt renewable energy solutions for the people's benefits.

 Das Programm Erneuerbare Energie Indonesien/ASEAN spielt eine prominente Rolle, lokale Akteure zu befähigen, Erneuerbare Energien zum Wohle aller einzusetzen.

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