Understanding Community Empowerment Process :
A Case Study of A Rural Locality In Indonesia

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Abstract

In developing countries, many community empowerment efforts, which consist mainly of building the community's capability to fulfill its needs, failed to achieve the desired result. Counter-intuitively, sometimes the dependence to external agents grew even stronger. The paper is a preliminary attempt in elaborating a successful case of empowerment process using system dynamics modeling, which is a poor village in Indonesia that received an infrastructure aid from a UN-agent in the form of Microhydro Plant.

The model shows that empowerment is a feedback process influenced by many factors, and that capacity building to manage the plant is a learning process to be gone through by the community itself. Nonetheless, once this capability is achieved, the resulted capacity and awareness play significant role to improve the community's life quality. This model is expected to evoke other efforts to build a more comprehensive understanding of community empowerment process, and hopefully will encourage the local government to try new approaches for higher rate of successful implementation.

Problems With Rural Community Empowerment

Community empowerment is an economic development concept that includes social values. The concept reflects the new development paradigm which is people centered, participatory, empowering, and sustainable (Chambers, 1995). To empower a community means to elevate degree of freedom of the community to free themselves from the poverty and marginality entrapment. In such context, the frame of reference is that basically the community has potency to be developed, and that empowerment process is an attempt to build the innate capacity of the people and awaken the consciousness of this potency, and develop them further.

However, many development projects which include empowerment process, especially in developing countries such as Indonesia, failed to meet the desired results. Korten and Bagadion (in Cernea, 1988) assumed that the main cause is negligence of social issues. They proposed that in the preliminary stage of rural development project, what is needed is not a detailed comprehensive plan, but a learning process instead. Similarly, Korten (1984) in his study of successful rural development program in Asia found out that the initial planning differ much with its implementation.

Chambers (1987) stressed the importance of development approach as cooperative effort, which is putting poor people as the first priority. New ways of dealing with problem must be learned by the poor people, because experts must someday leave while the community still have to deal with the problems. This learning process constitutes the most important part of community empowerment approach.

Community Empowerment Through Microhydro Aid : A Case Study

Electricity supply for rural areas is a strategic attempt to support the acceleration and distribution of development. The availability of electricity in rural areas will create new economic activities, improve productivity as well as quality of life in general. For remote areas in Indonesia with no access of conventional transmission line, the need for electricity is supplied by building small electric power plants using alternative energy resources. In West Java Province, The Micro Hydro Power Plant (MHP) is the most appropriate choice due to its hilly terrain and abundance potency of rivers.

Technologically, the MHP choice is also profitable because of its simple construction, easy maintenance, and operable by rural community. The development of MHP in rural areas also possess great potency to be developed as community empowerment effort, because the management and maintenance of MHP must be conducted by the community itself. In the process, social learning occurs automatically so that the community learns how to empower themselves.

In order to achieve The Millennium Development Goals, in 2003 UN-ESCAP (United Nation Economic & Social Commission for Asia and The Pacific), offered to implement the 5P Program (Pro Poor Public Private Partnership) in Indonesia, by building a microhydro plant. The chosen location is Cinta Mekar Village, Subang Regency, West Java, Indonesia (Fig. 1). The UN-ESCAP provides the financial aid at the sum of 75,000 USD, with an equal amount of money must be provided by a local private company.
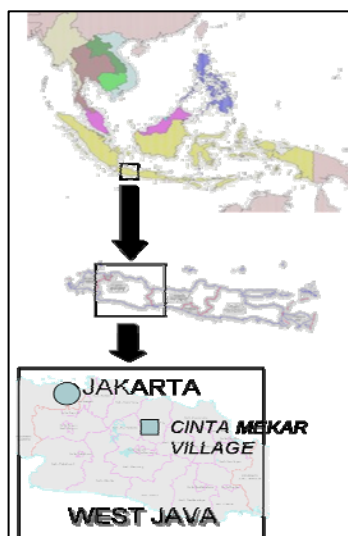

Figure 1. Location Index.

The development of MHP is managed by an NGO named IBEKA. The generated electricity is sold to The State-owned Electricity Company (PT. PLN), with the income divided fifty-fifty for the private company and cooperative of Cinta Mekar for improving community welfare.

This study is an attempt to record the community empowerment process that happened in Cinta Mekar Village. Hopefully, by taking a success story of community empowerment effort as a case study, some key issues can be elaborated. The use of system dynamics approach aims to present the process in a more comunicative way, especially to authorities and related parties.

Data Collection

Using stages of system dynamics modeling by Saeed (1995) as reference, the study was conducted according to the following stages :
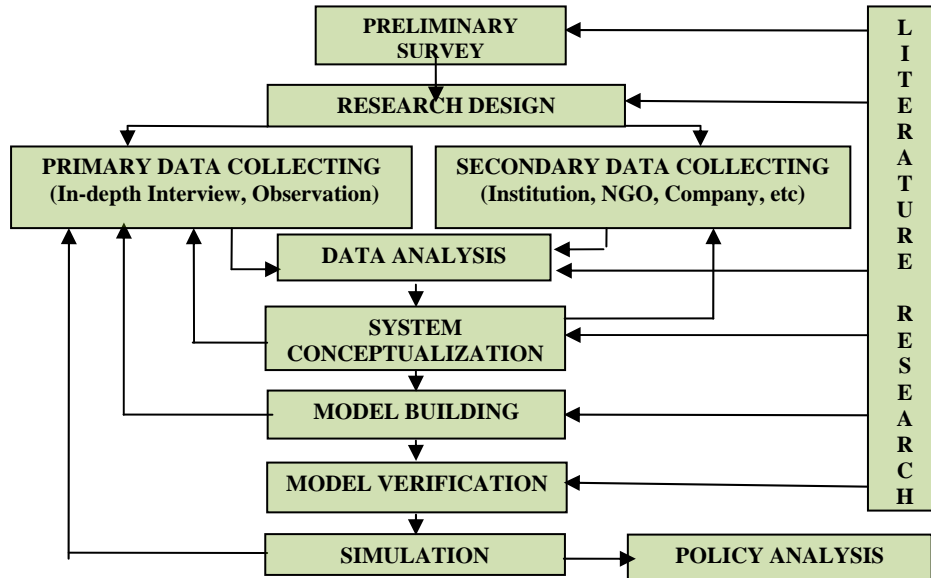

Figure 2. Stages of Model Development.

As stated in the diagram, data collecting are carried out before system conceptualization stage. Types of data, collecting techniques, analysis techniques, and its usage in modeling stage are given in Table 1.

Table1.   Types of Data, Its Collecting and Analysis Technique

	DATA CATEGORY	
	PRIMARY	**SECONDARY**
TYPES OF DATA	▪ Interview transcript ▪ Observation reports	▪ Village Profile & Demography ▪ Micro-hydro technical Data ▪ Agreement/Contract, Permits, Work plan, Reports, Papers ▪ Meeting Reports
SOURCE OF DATA	▪ Village people, personnel, NGO, Local Authoritative, Investor ▪ Community Meetings and Cooperative Meetings	▪ Village Office, District Office, Statistic Bureau, Other Related Institutions ▪ NGO (IBEKA), Investor (PT. HIBS), Cooperative, UN-ESCAP
TECHNIQUE OF DATA COLLECTING	▪ Informal in-depth interview, semi-structured ▪ Participant observation	▪ Formal approach
TECHNIQUE OF DATA ANALYSIS	▪ Grounded Theory ▪ Discourse Analysis	▪ Grounded Theory ▪ Content Analysis
DATA USAGE IN MODELING STAGE	▪ Problem Definition ▪ Model Conceptualization ▪ Model Building ▪ Model Evaluation ▪ Validation and Model testing	▪ Problem Definition ▪ Model Conceptualization ▪ Model Building

Respondents for in-depth interview are chosen purposively, consists of : rural representatives from different occupation, gender, and economic status; micro-hydro management personnel, consists of operators and cooperative personnel; NGO personnel as facilitators; representatives from local investor; and local authoritative. The interviews are conducted several times for the purpose of structural system verification, as well as validity and model testing

Community Empowerment Process

The village of Cinta Mekar has a population of 2.060 persons, or 646 households. The main source of income is agriculture, mostly paddy field which constitutes 75% of its total area. Most of the population live below poverty line, with annual per capita income between 200 – 400 USD. In some parts of the village, the yearly harvest is three times a year, while other areas with poor irrigation condition, the harvest can only be once or twice a year. Between those harvesting time, most of the male population go to nearby town to seek temporary jobs at construction projects.

To define the priority of community empowerment program and target groups, a social mapping activity was conducted using Participatory Rural Appraisal (PRA) method with main goals to identify existing problems and their solutions. The community also grouped households into several categories to define the target of aid. The mapping activity was facilitated by a UN-ESCAP personnel, the summary of the results is as follows :

Table 2. Results of Mapping of Social Problems in Cinta Mekar Village

Problems	Proposed Solutions
Basic service for the poor (electricity)	*Installation of electricity*
Unemployment	*Productive activity to increase income*
Low income level	
Low human resource quality	*Education and training*
	Improvement of health service
Togetherness in problem solving	*Contribution in infrastructure improvement*
Limitation of public infrastructure and facility	*to support the emergence of sense of belonging and community participation*

However, after the aforementioned meeting some dissatisfied member of community began to question the reliability of the grouping criteria because some really poor households or elderly members of the community is not included as the target aid. Eventually, the discourse led to re-identification of economic status of every household in the community by conducting an overall survey. The result of the survey is comprehensive enough so that comparisons can be made with formal data.

To define the usage of income from electricity, the community formed a cooperative for the purpose. As initial agreement, in the first years the biggest part of the fund will be allocated for electrifying the poor households. There are 150 households in this village which have not been electrified, mainly because of inability to pay for installment fee.

The rest of the fund is agreed to be used for education (scholarship for the poor), especially for elementary school and junior high school. However, some of the villagers insisted that equal portion of the fund should also be allocated for creating productive economic activities, consists of capital for small business credit and facilitation for new productive groups. Those who wants to expand new kind of business is encouraged to form groups and then given relevant training as well as financial support which had to be returned after certain length of time.

Allocation fund for education is agreed upon scholarship for elementary students to continue their study. In health sector, priority is given to facilitate free medication for poor, sick, elderly member of the community. Some fund is also allocated to provide immunization for toddlers and maternity care. Other priority of fund allocation is to improve public facilities, especially to repair irrigation infrastructure to improve production of paddy field. Some amount of fund is allocated for repairing the baby care unit and building a kindergarten.

From the process of deciding what to do with the fund, we can infer that there is no linear process in the making of conclusions. Oftentimes, the process took several days or even weeks to decide upon one single allocation of fund. Eventually, the resulted proportion of allocation can be agreed satisfactorily by every member of the community. The iterative process of deciding collective issues almost always include the emergence of friction among members of the community. It is realized, however, that the role of facilitator (from NGO) in this matter had been really helpful, first as catalyst of friction, and also as a mentor that everybody turned to ask about anything.

Other interesting thing to note is the iterative process of deciding who deserved to be granted aid. The reality that after certain feedback process the villagers refused to accept grouping by an international consultant is quite rare. As noted by the UN-ESCAP consultant, at first nobody had any answer to the question of how they want to improve their life quality. It is assumed that it happened because they always told what to do, and for so long nobody has asked them *what they want to do*. After some long pause and awkward moments, then some most vocal members of the community hesitantly began to answer. The fact that afterwards they can form their own criteria of the people that deserved to be helped, shows the emergence of the community's sensitivity to their own problems and confidence of their own power to solve them.

Lengthy discussions either formally or informally to decide the allocation of fund can also be marked as signs of empowerment process. Unintentionally, many problems that previously never mentioned or even unnoticed by most of the villagers emerged. For instance, it turned out that nobody knew the exact number of people who live at the most remote parts of the village, some just realized that there are many elderly people who live alone with old age illness in their community, and nobody knows for sure how many students continue their study outside the village. That's why the recent questionnaires distributed by the NGO helped much in building the shared information of their own village.

During the learning process, according to interviews with members of the community, at least three needs are identified by the villagers, which consequently led to actions to fulfill them. Those are :

(1) *The need of additional knowledge and skill*
The existence of microhydro plant requested certain level of skill improvement, especially for the personnel chosen as the operators of the MHP, and cooperative personnel that manage the generated income. Beside technical knowledge and skills related to the operation and maintenance of MHP, simple administration and accounting skill had been realized as a must. Again, the role of facilitator is maximized in this matter, as the skill requirements actually is of no advance level. The new technology brought by the existence of MHP also made the villagers realize the importance of knowledge. Some interviewees mentioned their intention to continue their education, and even more expressed their increasing concern in their children's education.

(2) *The need for expression and means of communication*
The intensity of meetings either formally or informally among the villagers, pushed forward the need for communication skill, to express opinion in forum, and to talk more 'cleverly', which are previously unknown to the community. Included in this kind of need is the requirement of written expressions, because they have to deal with many external agents in the form of letters and paperwork.

(3) *The need for new kinds of productive activity*
The opportunity to open new productive activities is made possible by the availability of fund generated by the electricity income. This opportunity create some hot discussions as to what business is appropriate to be developed in the village. Among others are to make banana and guava chips as home industry, and to plant other more beneficial commodities than rice, such as spice plants that recently grows more in demand.

Things that can be categorized as hindrances to the community empowerment process are as follows :

(1) *Internal Conflicts*
The presence of internal conflicts, although serves an important process toward organization stability, oftentimes lower the motivation and enthusiasm of the community to contribute for the betterment of society. Included in this kind of conflicts are : social jealousy, friction between groups to attain important positions, disagreement of ideas, etc. However, the level of internal conflicts that happened in Cinta Mekar village is still considered acceptable and normal.

(2) *Apathy and Reluctance*
The low educational level of most villagers had caused inferiority and reluctance to include in any collective activities related to the management of the MHP. Sometimes, this reluctance ended up as opposed behavior toward any collective decision. Considerable efforts were required to

increase participation in community meetings and to grow the sense of belonging toward the microhydro plant.

(3) *Instant Mentality*

Instant mentality is more or less a behavior that has little respect to process, caused by long nurtured habit by the old government to implement the so-called development agenda. In old times, the development pattern almost always in the form of crash program, where the community just watch the development activity being carried out in their village by some external agents, and then the villagers could enjoy the development product instantly. This condition is noted by the UN-ESCAP personnel that the idea that basically the villagers can solve their own problems seemed strange for the community.

(4) *Bureaucratic Interference*

There are many obligations that must be met in order that the microhydro plant can be operational, such as various permits from local governance that required certain amount of money to be issued. From the interviews, it is noted that these obligations acted as one source of hindrance that lower the effectiveness of empowerment process. The main reason is that because until the MHP is operated, there is no income, but no operation is possible until they pay some money for the permits, of which they have none. In turn, this had become some kind of a trauma for the village people to see local government personnel, because they relate it to the obligation to pay some money.

Translating The Empowerment Process Into A Dynamic Model

Recent development in the field of system dynamics shows an increasing need to include quantitative variables in modeling, especially those related with social structure modeling. Wolstenholme (1998) suggested that both quantitative and qualitative system dynamics are important, and its usage depends on the purpose of analysis. He addressed the true power of system dynamics to be in the judicious blend and intertwining of both qualitative and quantitative ideas, aimed for as broad audience as possible whilst remaining sufficiently rigorous to be useful

However, quantifications of causal model that contain many so-called "soft" variables is often problematic because so few "hard" data are available to calibrate the model (Akkermans, 1995). It is worth mentioning that efforts to solve problems related with quantifying the qualitative data are blossoming, and hopefully will eventually lead to formalization of such procedure. In this study, attempts to quantify several qualitative variables that were carried out especially those related with the empowerment process gone through by the community in order to achieve the desired management capability of MHP. The main consideration is because the process is considered very important feedback loop to attain the sustainability of micro-hydro infrastructure. As stated by Sterman (2000, p. 854) : "Omitting structures or variables known to be important because numerical data are unavailable is actually less scientific and less accurate than using your best judgment to estimate their value.".

The system dynamics model reflecting the empowerment process that happened in Cinta Mekar village is focused on how the community went through the learning process until the required capability of managing, operating, and maintaining the micro-hydro power plant is achieved. Without any external disturbance, the attainment of this capability will ensure the sustainability of the plant, and thus the generated income can be used for improving the community welfare. Indicators used to measure the success of community empowerment process are : community income, education level, and health condition of the community.

In system conceptualization stage, in-depth interviews are conducted along with content analysis of related documents. Afterwards, causal and flow diagrams is built using references as aid, especially in translating the qualitative relationship into quantitative issue for the purpose of simulation. Verification of the model is carried out with semi-structured interviews. The general causal loop is shown in the following figure :
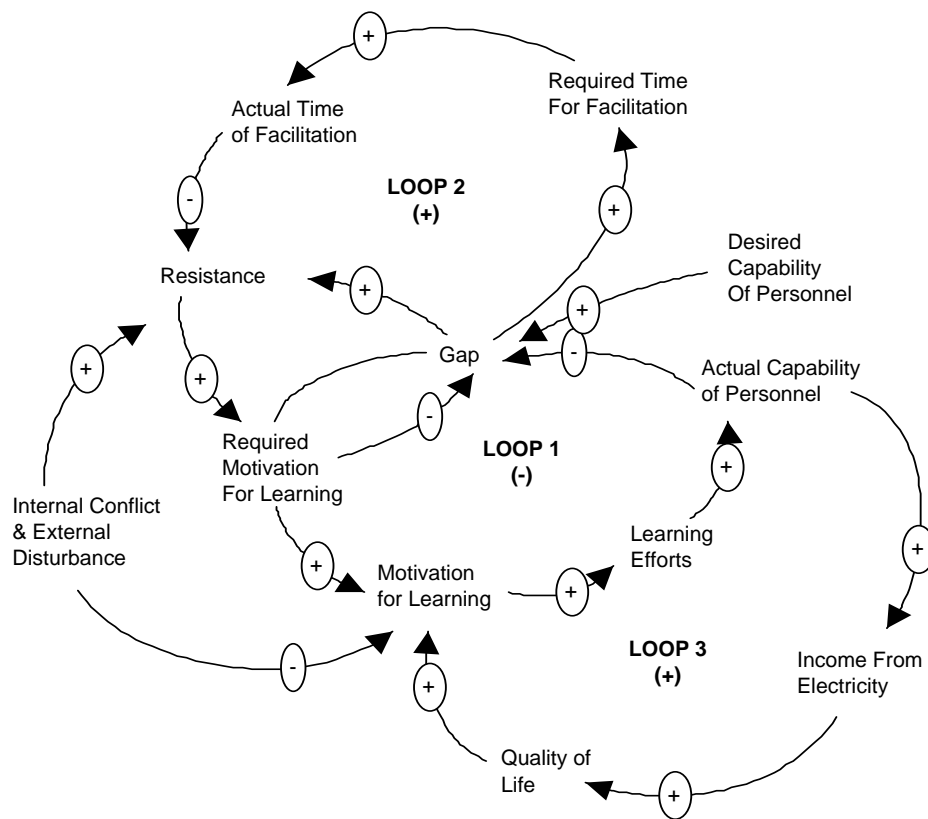

Figure 2. General Causal Loop Of Empowerment Process.

As seen on the above picture, Loop 1 which is goal-seeking (-), basically describes how the capability to manage the MHP is achieved. There are certain requirements to be met for the villagers to be able to manage a 100 kilowatt microhydro plant successfully, such as : technical and managerial skill, length of training, level of education, trust from the community, etc. Failure to meet this demand will create a gap between the required capability and actual quality of human resource. To reduce the gap, learning efforts either conducted by individuals or facilitate by external agents will be required. In Cinta Mekar village, several trainings had been

carried out facilitated by NGO and National Government to help build this capability. But the success of those efforts depends much on the motivation for learning that has to exist in the personnel. If the actual motivation is not match the required motivation, then learning won't occur. In this case, the role of facilitator can be crucial to awaken or strengthen the motivation for learning in the community, especially because some conflicts either internally or externally could decrease the motivation, as we will discuss next. It must be understood that this process requires certain amount of time, therefore delicate calculations of when it has to be conducted could be critical so that the person in charge is ready to be employed at the time the construction of MHP is finished.

However, the existence of gap between what is required and the actual capability of personnel will create resistance amongst the community as shown in Loop 2, mainly because of the low average education level of the villagers. Various forms of resistance can be found in this case, such as : reluctance to participate, internal conflict between groups, apathy, and sense of helplessness that is exposed in the expression that the MHP matters are too complicated for them. Counter-intuitively, inappropriate interference of Local Government in this matter by charging some money for issuing permits makes the resistance even stronger and lower the motivation for learning. In turn, it will widen the gap, and eventually the required capability of managing MHP will never be achieved. To combat the resistance, intervention from external agents is needed in the form the existence of a facilitator, whose role had been acknowledged widely by the villagers to be of significant value. It can be inferred then, that Loop 2 which is reinforcing is very important in determining the sustainability of MHP or any infrastructure aid in general.

When the capability of managing MHP is achieved, the operational of the plant can be started and the electricity can be sold to generate income for the community as shown in Loop 3. The availability of monthly income is then used for improvement of welfare as had been agreed previously by the whole village, among others is to finance productive activities to increase per capita income, which in turn will increase life quality of the people as shown by Human Development Index. The increase in life quality overtime will increase the motivation to improve the human resource further.

Simulation Results

To build flow diagram of the learning process in improving the capability of MHP management, modification is made to the individual learning process model in relation with improvement of intellectual capital in an organization by Koenig and Membrillo (1998). In the base model, the individual learning process is accumulated in individual knowledge that depends on 5 factors, namely : experience, internal learning, external learning, intelligence, and curiosity. In the modified flow diagram, external learning is represented by trainings, intelligence variable is the average length of schooling, while internal learning and experience is combined into apprenticeship experience, which the chosen personnel must undergo, assuming that in the apprenticeship period both processes did happen.

The curiosity variable is replaced by motivation for learning, with the assumption that in this case the need for improving capability does not generated by curiosity, but by the need to manage MHP.

The accumulation of motivation is influenced negatively by internal conflict and external disturbance, and positively by external support. To quantify the internal conflict and external disturbance, a range technique proposed by Akkermans (1998) is used, with the value between $0.0 – 1.0$. Internal conflict is assumed to be 0.1 of value, meaning it is still acceptable and normal, while the external disturbance is between $0.2 – 0.3$, which means the intensity of disturbance is quite often.

The start time for simulation is year 2003 because the preparation for developing the MHP had begun since early that year, and simulation ends at year 2025, assuming that maximum lifetime of an MHP in Indonesia until now is not more than 25 years. The resulted behavior of motivation for learning and capability to manage micro-hydro plant is shown in the following figure :
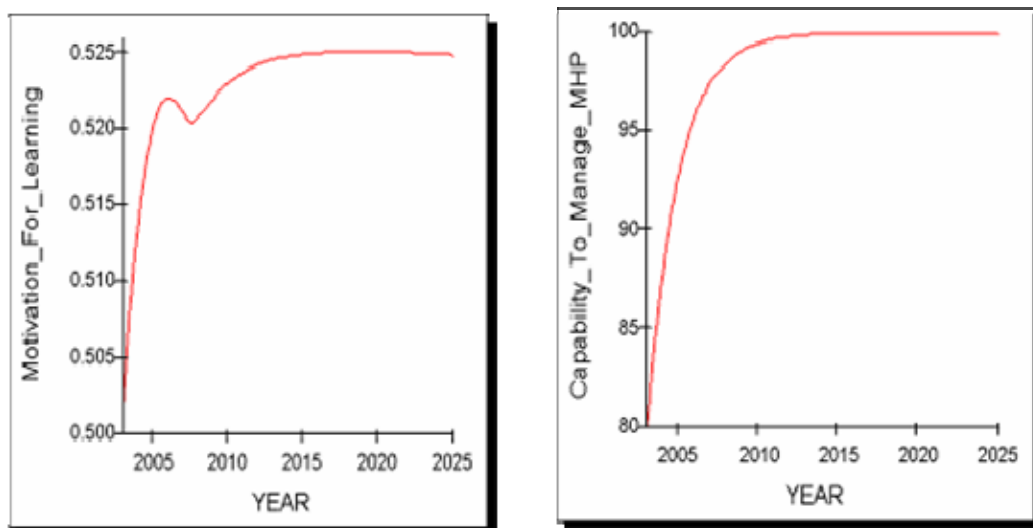

Figure 3. Behavior of Motivation for Learning and Capability To Manage MHP.

The motivation for learning behavior that is essential for improvement human resource to achieve the desired capability shows an exponential growth in the first years, which mainly caused by the presence of facilitator and attention and facilitation given by the National Government and International agents at the beginning of the project. The growth is slowed in the following years because it is assumed that external support will stop once the MHP is running well, while the internal conflict and external disturbance still exist. However, the motivation for learning continue increasing when the capability of MHP management is achieved. In turn, the sustainability of MHP will result in the improvement of community, education level, and overall condition of community welfare.

Model Validation and Testing

One of the most common way to test model validity is by comparing model behavior with its historical data. In this study, acquiring such historical data is very difficult. The main cause is due to lack of reliable institution that is responsible for gathering time series data in a village or district. Thus, validity and model testing by comparing model behavior with historical data can not be conducted herey.

However, historical fit is not the only way to test a model. Sterman (2000) elaborates 12 types of model testing which are adapted and developed from Forrester and Senge (1980). From the 12 ways to test model validity, there are 6 types that were conducted in this study, as shown in Table 3.

Table 3.   Model Testing Conducted In The Study

No.	Type of Testing	Techniques of Testing	Improvement Efforts
1.	Boundary Adequacy	Re-checking interview transcript, re-asking people involved in the system, verifying to modeling experts	Repair model structure according to new inputs; integrate elements that are related with problem definition.
2.	Structural Assessment	Verification of system structure to people involved directly with the system	Repair and improve model structure
3.	Dimensional consistency	Checking consistency of dimensions in all functions and formulas	Repair unreal dimensions; recheck and replace function and flow diagram
4.	Behavior anomaly	Changing equilibrium assumptions with in-equilibrium	Recheck and repair model structure whenever anomalies are encounter
5.	Sensitivity Analysis	Using specific range of input value to test sensitivity of some model parameters.	Use the result obtained from sensitivity test to optimize policy
6.	System Improvement	Designing instrument in advance to predict the effect of modeling to mental model, behavior, and result.	Design policy recommendation based on findings from the modeling activity to be implemented in other locations and/or other cases.

Sensitivity analysis conducted (Figure 4) shows that the most significant variable for the achievement of required capability for MHP management is improvement of motivation. While the motivation improvement influenced mainly by amount of days of facilitation (positive influence), and the magnitude of external disturbance and internal conflict (negative influence). When the actual facilitation time is less than the optimum period along with great amount of friction, the desired capability will never be achieved, causing the capital and lifetime of MHP to decrease severely. In other words, the MHP will fail to be sustainable.
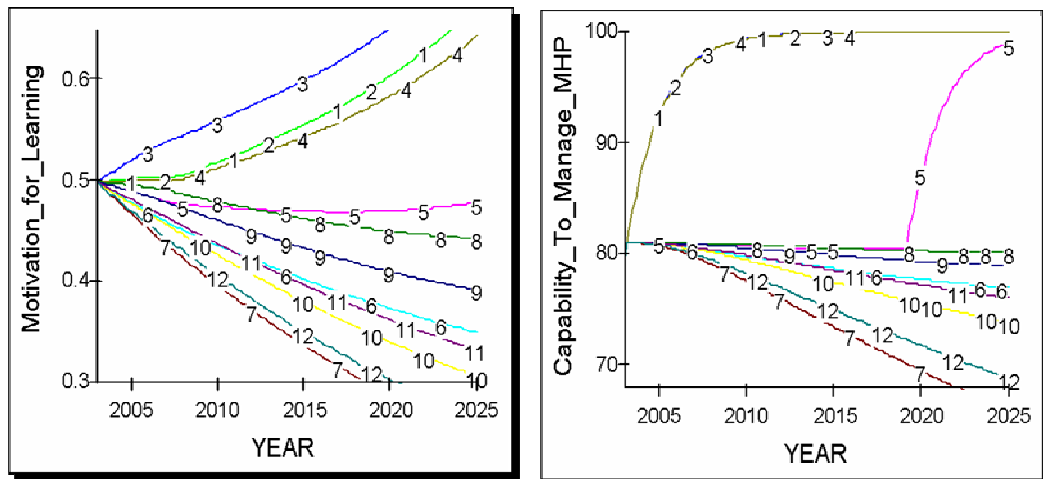
Figure 4. Sensitivity Analysis of Motivation For Learning and Capability To Manage MHP Variables.

Conclusion : Towards A Thorough Understanding of Empowerment Process

Several things that can be concluded from the analysis of the empowerment process model, they are :

(1) *Empowerment as an iterative process*, the current approach that is commonly used, especially by government agents, is to provide an initial plan to be implemented as an empowerment effort by consultants or project initiatives. If the main goal is to grow the community's awareness of their own problems and to awaken their confidence and capability to solve them, then this approach should better be evaluated.

(2) *Motivation to improve capability must be maintained,* obstacles that lower the motivation for learning to achieve the desired capability, such as existence of internal conflicts and external disturbance, must be minimized in order that the empowerment process be successful. One way is to provide a facilitator that works with the community, who can act as catalyst in the presence of conflicts. Other way is to put more concern on the trust factor in choosing the personnel, and to eliminate the external disturbance that in this particular case came mainly from the local government.

(3) *The impact of empowerment is new awareness of the community's strength,* rural community usually has relatively low self-esteem due to the limited average educational level. The process of allowing the community to discuss, choose, and decide issues that matter most to them, beside improving their capability, also increasing their confidence to solve their own problems.

Lastly, this model is a preliminary attempt to understand the empowerment process in a more communicative way using system dynamics modeling. Hopefully, this attempt will be continued by more efforts to perfect the model so that the rate of successful implementation will increase, and the empowerment efforts in the developing countries such as Indonesia will be more effective. Some limitation of this model should be perfected, such as the

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adequacy of model boundary, or take different cases of empowerment process for comparison to obtain a generic model. The consistency of secondary data should also be taken cautiously, because in rural locality in Indonesia, to get reliable time series data is exceptionally difficult. Different approaches in quantifying the abstract relationships should also be exercised as to improve the validity of the model.

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