Community Empowerment through Appropriate Technology: Sustaining the Sustainable Development

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Abstract

Rural communities are the major entities in developing and third-world countries. While outsiders want to develop local community, they should develop the local conditions and sustain the result. In order to get sustainability among rural communities, technology become a booster to reach it. However, the success rate of many community development projects result only compare between “before” and “after” condition of technology implementation. Furthermore, when its result reaches sustainable condition of community development, many communities cannot further maintain as well as develop their sustainable development because low level of empowerment. This paper attempts to develop conceptual framework how to reach the sustainable development in a community which is strengthened through the implementation of appropriate technology in order to reach empowerment. The framework will be constructed through literature survey and then combined with several sample cases to provide a comprehensive discussion. This paper concludes that empowerment is the next shape of sustainable development. Three stages of community development are revealed. Appropriate technology can be positioned as the bridging point in reaching empowerment of rural communities. By looking at previous efforts which treat sustainable development as the final purpose of community development projects, this paper give new lights how to reach beyond it. Empowering rural communities, sustaining their sustainable development.

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Keywords: Community empowerment, community development, sustainable development, appropriate technology

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1. Introduction

Community empowerment had been proven to be a powerful approach for solving many community problems [1]. The critical point of many community development projects is about the mindset of outsider in their efforts to develop rural communities. Projects are subjected to get a better local condition, but only few efforts to ensure the sustainable development. While outsiders want to develop local community, they should develop the local conditions and sustain the result. However, when the results reach sustainable condition of community development, many communities cannot maintain their sustainable development because the low level of empowerment. Ferguson [2] stated that empowerment is categorized as transformation process of a community. In order to fasten the process, technology is always needed to bring multiplier effect for the transformation process [3]. Many governments, business, and community in developed, developing, even in third-world countries always continuously attempt to develop technologies that are efficient and fit within local fiscal limitations [4]. Long time ago, Teitel [5] stated that developing and third-world countries have been quite concerned with the problems which is caused by technology introduction and acquisition in community development, a condition which is still exist today. However, the success rate of many community development projects result only compare between “before” and “after” condition of technology implementation. Because of that, the opportunity in implementing appropriate technology in community development projects need to be widened to reach beyond sustainable development, how local communities can maintain their sustainable development by themself and reach empowerment. Therefore, this study will answer following research questions:

RQ1 What kind of technology that can be applied to solve community problem in reaching empowerment?
RQ2 What is the appropriate conceptual framework that can be adapted to transform community development into community empowerment?
RQ3 What efforts to outsiders do to sustain the sustainable development of rural communities and reach empowerment?

2. Literature Review

2.1. Community Empowerment

Empowerment should be the ultimate goal of any community development projects. While development often interpreted as the flow of resources from outside into community, empowerment push-and-pull full participation of all community members to change their world by themself, from inside to outside [2]. Speer and Hughey [6] concluded that community organization is an important way to reach empowerment. They stated that it is tightly related to the ecology of local community, how any outsiders must pay attention to the psychological condition of community in order to reach social power as the predecessor of empowerment.

As the efforts in sustaining the development in community empowerment project, Sianipar and Widaretna [3] have tried to develop new model based on triple-helix concept. The model was developed on the field directly to find the most comprehensive way in connecting three most important parties in community empowerment which are coordinated by NGO as the axis. Their model development was revolutionizing the way of collaboration between stakeholders.

As the main entity in developing countries as well as in community empowerment projects, community members behave as the business institution (B) of every production and trading process. The next party is university (U) which is represented by researchers. The researchers should come to community empowerment projects to apply their scientific knowledge into the application of appropriate
technology. The convergence of business and technology in terms of appropriate technology implementation could have such an effect on financial benefits, so the researchers’ knowledge must be safely kept by the NGO through agreements. The purpose are any knowledge capitalizations must be applied only and directly by the community members, not by other commercial institutions. Furthermore, the government (G) join the triangle as the third party. Knowledge capitalizations need financial investment and supporting policy from government.

![Fig. 1. Triple-helix model in a community empowerment project [3]](image)

2.2. Appropriate Technology

Several researchers [7, 8, 9] had same intention to state that the cross claims between technologists about the weaknesses as well as strengths of their technologies are almost consist of prejudice, ignorance, or intolerance. The appropriateness of a technology then became big questions related to its implementation on the fields. In order to answer those questions, the key points of technology appropriateness can be seen based on the respected definition thoughts [10].

As the oldest and most referred thoughts, “appropriate technology” was interpreted as several integrated efforts in a product design or innovation development which include social and cultural aspects [11], and also called as a complete approach to do a self-adaptive development in dynamic conditions [12]. Their statement was based on the main purpose of appropriate technology: the users can afford the technology and also use relatively high technical system through the increase of their wealth and skills. In short, researchers who believe on appropriate technology approach concluded that the phenomena of appropriate technology emerge together with the specific conditions in a local area that need a technology which is appropriate with local people’s needs and wants [10].

On the other hand, the presence of appropriate technology also faced some critics from other researchers. The critics had same intention to state that appropriate technology may not be sufficient or good-enough from engineering perspective. Although from different eras, they similarly stated that it is conceited and naive to define any technological effort that improves capability to satisfy local community aspirations and goals [13].

2.3. Sustainable Development

Discussions about community empowerment cannot be separated from efforts to sustain development. The concept of sustainable development has significantly expanded over the decades. Just looking at the Internet, the phrase “sustainable development” was featured on 8,720,000 web pages in 2005 [14] and
now it appears on 198,000,000 pages [15]. The definition of “sustainable development” that is referred to most often came from the WCED. They stated that, “sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs” [16 p.43]. The definition relies on two key concepts. The first key concept, “needs,” meant that overriding priority must be given to the essential needs of the world’s poor. The second key concept was stated as the meeting of present and future needs by using social organization and technology to expand the environment beyond its common limitations.

As explained by Sianipar and Widaretna [3], community members become the main business partners in community empowerment projects, and so sustainability can also be traced from the business perspective. Some businesses desired to change the world through social, environmental, and economic values [17, 18], which are together called the “triple bottom line” (TBL). On the other hand, the term “TBL” was also used to refer to “people, planet, and profit,” in parallel with the first “TBL” definition [19, 20, 21]. These businesses suggested that the business world’s understanding had been evolving to encompass considerations of economic viability, environmental sustainability, and social responsibility as well [22].

Furthermore, Fisk [20] noted that businesses should find purpose beyond profit maximization to reflect their concern for the global future. In terms of the nature of a business, the economic side should be sustained through efforts to reduce costs, react more quickly to changes in the market, and increase every process’s performance. However, businesses must (not just should) sustain the environments around them. Some researchers have also tried to link the environment to hazard mitigation issues [23], and others connect it with issues of heritage [24]. Markley and Davis [25] stated that the environment become another performance-enhancing activity for businesses. Moreover, social issues are the final pillar in sustaining development. Common business entities in industrial areas often overcome social issues through their Corporate Social Responsibility (CSR) programs. However, community members as business entities tend to hope that the social issues will determine their efforts to support their social goals [26], meaning that they choose to pursue social welfare because of their desires to build relationships with each other [27].

More broadly than these approaches, there were three perspectives [10] to consider in deciding the most appropriate technology in terms of increasing technology acceptance among communities. Whereas the world community all has the same tendency to see “green” issues as a part of business [28] that failed because of the exploitation of community resources and people [29, 30], many proposed a broader definition of “green” from a engineering perspective. “Green” as an ultimate environmental goal must be achieved through the wider meaning of the technical perspective. All efforts to sustain the environment must not be merely jargon or slogans but must be applied as technical efforts to exactly measure environmental impacts through technical assessments. That approach will ensure that “green” can be clearly accomplished.

2.4. Theoretical Framework

Communities that lack development must be developed through community development. Then, the increased knowledge will sustain the development. After that, the transformation process should be continued to reach beyond sustainable development to empowerment. As a boost to the transformation process, appropriate technology should also be implemented in several stages to ensure the expansion of the effects of the technology implementation. The stages should include the participation of three main parties in community empowerment projects [3], which also includes taking into account existing appropriate technology as well as sustainable development ideas. Because of that, the term “appropriate” should also be interpreted differently in terms of the different levels of appropriate technology at each
stage. Moreover, even though all three parties are participants in the process, the focus of all efforts must be directed to the community members as the main entities in community empowerment projects.

Fig. 2. Theoretical framework

3. Methodology

Empowerment as transformation process of a community should be understood completely through scientific thoughts as well as real field problems. Because of that, this study uses literature survey and combined with multiple case studies. In order to provide complete pictures of the main idea, the sections are designed systematically based on the mix-method approach. The first section explains about the background what this study address as well as three research questions that must be answered. Existing literatures show that there are contradictions between the concerns from several entities in community empowerment projects to the implementation of their efforts related to the use of appropriate technology for sustaining the community development. Then, the second section reviews literatures of each idea, which are about community empowerment, appropriate technology, and sustainable development. The result is the theoretical framework which is used as the guidance in reaching the main purpose of this study. After that, a comprehensive discussion is provided in order to explain the debatable thoughts, how to sustain the sustainable development through appropriate technology. That section also attempts to provide the answer for research questions of this study. Last section will summarize the discussion and findings into several conclusions to give framework how to reach empowerment of community, which is beyond sustainable development. Additional section is used to explain the limitations of this study as well as ideas which can be used to give initial insights for further research based on this study.

4. Discussion

4.1. Sustaining the Sustainable Development

The term “sustainable” is often interpreted as the final solution of development. However, contradictory results can often occur when the sustainable development mostly comes through the intervention of outsiders to rural communities. Cases in Africa [31] as well as Appalachia [32] have shown that sustainable development conditions must be continued to reduce the dependence of the community members on the outsiders. Closely related to the reality that community members are the main entities as well as the business parties in community empowerment projects [3], their motivation [33] is to work to continuously sustain given conditions after the outsiders have left. Based on these field cases and thoughts, the phase after development can be interpreted as the next level of sustainable
development. When that idea is faced with the main purpose of the sustainable development concept, which is concern for “the ability of future generations to meet their own needs” [16 p.43], there is a meeting point between the keywords “ability” and “own.” This means that outsiders must be aware that every community development project should be developed using an empowerment approach. As a transformation process [2], empowerment will ensure the sustainability of any given sustainable development.

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\text{EMPOWERMENT} = \text{SUSTAINING THE SUSTAINABLE DEVELOPMENT}
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\text{EMPOWERMENT} = \text{SUSTAINABLE (SUSTAINABLE DEVELOPMENT)}
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\text{EMPOWERMENT} = \text{SUSTAINABLE DEVELOPMENT}
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The differences between development, sustainable development, and empowerment can be interpreted through appropriate keyword(s) for each development level. A development level can be defined as when outsiders give “things” to develop a local community. The result is a condition in which community members gain benefits compared with their conditions before the outsiders arrived. In short, the keyword is “give.” The next step is sustainable development. This condition is the next purpose of development. The outsiders give “things” to rural community members to increase the quality of their lives. The “give” process is followed by efforts to maintain the development. This maintenance can also be interpreted as efforts to sustain the ongoing development. The outsiders teach the community members how to maintain the development on their own. Thus, the right keywords are “give” and “maintain.”

![Fig. 3. Comparison between development, sustainable development, and empowerment approaches](image)

However, maintenance efforts are only used to suppress the quality depreciation of the sustainable development itself. Sustainable development still faces many difficulties in overcoming future changes. The development may be maintained in some ways, but community members face many problems because outsiders do not teach them any skills to solve their future problems, such as how to make ongoing adjustments to the developments in their changing environments. Empowerment provides the solution. In that approach, outsiders teach community members to “make” the developments on their own. “Make” is the next keyword after “give” and “maintain.” By learning the making activities related to ongoing sustainable development, community members can always adapt their efforts to sustain the development on their own, even when the outsiders have already left the area and/or the project has...
ended. This is the empowerment level. At this level, the involvement of local entities is a vital point in maintaining the sustainable development. The output level of empowerment is decided by the combination of inputs, such as manpower, financial investment, and technology [34]; thus the continuous combined efforts of community members, governments, and academia must be maintained. The failure or success of sustainable development is heavily influenced by the ways local governments conduct their governance [35]. On the other hand, such efforts in making the development must be integrated with continuous efforts to increase knowledge transfer to community members from academia [3].

4.2. Appropriate Technology in Community Transformation Stages

It is clear that rural communities must be transformed to achieve empowerment, a condition that will ensure the continuity of sustainable development. Technology is a boost to achieving sustainability in rural communities. Particularly, appropriate technology has a strategic position in the transformation process [31]. Many cases [36-41] have shown that very good opportunities for appropriate technology implementation lie in the fact that the low incomes among rural community members make them unable to purchase advanced agricultural technology equipment to improve the quality of their agricultural products, a condition compounded by their lack of knowledge about cultivation as well as processing technology. This low level of knowledge makes rural communities generally very slow to understand and adapt to changing market conditions and to identify the technologies that could help them make their products meet market demand. This tendency results in difficulties for engineering consultants attempting to implement technologies in community development projects. Technology transfer nearly stops in terms of the community’s use of given technology, and local people are not empowered to develop and adapt the new technology into their daily routines [4, 32, 40, 42, 43].

The widespread popularization of proven appropriate technology techniques is very problematic and requires a concerted effort by everyone [3, 32, 44]. Furthermore, prior studies stated that technologies for less developed countries should go back at least in very simple forms to the dawn of human existence. In combination with the previous discussion, three stages of logic in achieving community empowerment are listed in Table 1.

Table 1. Stages of logic

| Development            | Outsiders give hoes to local people. The hoe will be used to develop farming activities. |
|------------------------|------------------------------------------------------------------------------------------|
| Sustainable Development | Outsiders give hoes to local people and teach them how to use and maintain those hoes using better methods. The use and maintenance of the hoe with better methods will sustain the development of farming activities. |
| Empowerment            | Outsiders give hoes to local people, teach them how to use and maintain those hoes using better methods, and also teach them how to make by themselves, adjusting the function based on required conditions. These efforts will sustain the sustainable development, empowering the local residents. When the outsiders leave, the local people will maintain the sustainable development on their own. |

Based on the above stages of logic, the implementation of appropriate technology can be interpreted by giving new meaning to the term “appropriateness.” The common meaning of appropriateness relates to the ways different communities must be developed using different appropriate technology methods, which will produce different outputs or results based on different inputs and local conditions. However, appropriateness must be newly interpreted with the same goal for different communities. In this approach, different methods of implementing appropriate technology must also adapted to local conditions, but all efforts and methods must also be adjusted flexibly to reach the same goals even with different inputs [46].
5. Conclusions

Rural communities are the major entities in developing and third-world countries. Commonly, outsiders help them through community development projects. However, many projects have ended with only a comparison between the “before” and “after” conditions. Furthermore, the development cannot be sustained by community members because of the low levels of community empowerment. At this point, appropriate technology can fill in the gap to transform community development into community empowerment. The appropriateness of appropriate technology can help community members in maintaining the ongoing development (sustaining the development) as well as in adjusting the technology to overcome future conditions in their changing environments. Table 2 shows the ideas in previous discussions and their parallel connections in a community empowerment approach.

Table 2. Framework of empowerment

| Social | People | Social | Community members |
|--------|--------|--------|-------------------|
| Environment | Planet | Technical | Academia |
| Economic | Profit | Economic | Government |

The term sustainability can be understood from the issues around sustainability itself, the consideration of which leads to perspectives of appropriate technology. At this point, appropriate technology is positioned as the involved parties’ bridge between the concepts of sustainable development and community empowerment projects. “People” as the focus of sustainable development must be interpreted as taking into account a social perspective in the decision and selection of appropriate technology. Furthermore, “Planet” should be perceived as all of the environmental effects of designed technology. However, it must be interpreted from a broader technical perspective on appropriate technology to expand the discourse on “green” issues. Next, the economic perspective must be interpreted as the amount of profit or economic benefit communities will receive after the technology implementation.

Finally, the involvement of the three most important parties must be encouraged to achieve the empowerment of rural communities. Community members must become the focus of community empowerment projects, and thus all social issues must be focused on how community members behave in their daily routines. All efforts must not violate their social goals but support their daily activities with higher quality. Furthermore, academia must support empowerment through their efforts in providing the best appropriate technology. Technical knowledge must also be transferred to community members to encourage the emergence of local “academia.” Moreover, economic issues must be supported through investment and policy. Local governments should be deeply involved in supporting the sustainable development from the financial side. All developed policy should also push and pull local people to adapt and adjust to the implemented technology to maintain the sustainable development in their changing environments. Through all of the above efforts, community members will always be able to maintain the sustainable development, thus achieving empowerment.

6. Insights for Further Research

This paper is a part of an ongoing research designed to develop the appropriate design methodology of appropriate technology for sustaining the development of rural areas and reaching community
empowerment. The modeling process is still underway therefore this paper would only able to discuss about the correlation between community empowerment, appropriate technology, and sustainable development. Other research may be able to extend this study in practical area with detailed issues of social, technical, and economic variables in local area. New research may also be designed to know the effect of changing environment to the adjustment or adaptation of appropriate technology based on the framework of empowerment.

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