BEHAVIOR CHANGE BASED ON PARTICIPATORY COMMUNITY EMPOWERMENT TOWARDS *BIO-CYCLO FARMING*

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Abstract

Community empowerment based on bio-cyclo farming by managing domestic waste integrated with yard agriculture is aimed at overcoming the problem of household waste while supporting family food security. This study aims to analyze behavior change through community empowerment based on bio-cyclo farming innovation. The study uses a quantitative approach,which is enhanced by qualitative information.The population in this study consists of farmers who participate in Pertamina EP at Zone 7's CSR Program and engage in bio-cyclo farming.The unit of analysis in this study is an individual member of the farmer group applying bio-cyclo farming. The respondents are selected using a census, where all farmer group members become research respondents. The number of respondents was 102 people. The research locations were in 5 villagesin West Java Province, Indonesia. The collection of research data was carried out in July-August 2022. The research variables arecommunity participation, facilitator capacity, community behavior changeand community empowerment rate.Data processing and analysis were carried out in a descriptive and correlational manner with the help of the SPSS Version 27. The study showed that the process of empowering bio-cyclo farming has resulted in various behavior changes, both at the individual and community levels. Changes at the individual level are changes in behavior, including knowledge, attitudes, and skills of society. Change at the community level is using new practices in society. Behavior change is conditioned through a participatory empowerment process, with a dialogue and convergent communication approach involving the program facilitator.

Keywords: Empowerment, Convergent Communication, Farmer Behavior.
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A. INTRODUCTION

The occurrence of the global food crisis plus the COVID-19 pandemic requires people to carry out social change in their lives.Community empowerment based on bio-cyclo farming by managing domestic waste integrated with yard farming is aimed at overcoming the problem of household waste while supporting family food security. Managing domestic waste is important, considering that Indonesia is facing a serious threat related to the increasing waste. In Indonesia, according to information from the Ministry of Environment and Forestry (KLHK), 67.8 million tons of garbage were created in 2020. In 2025, this amount is expected to rise

to 70.8 million tons. Around 42.1 percent of garbage comes from domestic activities, the biggest source (KLHK, 2021). According to a study conducted by Sustainable Waste Indonesia, up to 24 percent of Indonesia's waste is not managed. The trash situation is one of the government's major obstacles to meeting the SDGs target by 2030(CNN Indonesia, 2018).

Besides the waste problem, Indonesia also faces a serious threat related to food security problems due to converting agricultural land to non-agricultural land. From 2013 until 2018, an overview of the conversion of paddy fields from 7.75 to 7.1 million hectares, which means a decrease of 130 thousand hectares yearly, is given using satellite photography data(CNN Indonesia, 2018). One of the best options for preventing these two issues is to implement bio-cyclo farming innovations, which combine yard farming with domestic waste management. Bio-cyclo farming supports the paradigm change toward sustainable agriculture, which applies the ideas of environmentally friendly production(Zulvera et al., 2014).

Bio-cyclo farming, also known as an integrated organic farming system, is an agricultural practice that makes use of the biological cycle, which integrates and makes use of the waste produced by the community's livestock and fish as well as household trash (Agus et al., 2020; Dwikoranto et al., 2015; Sholichah&Wahyuni, 2019). The usage of bio cyclo farming is particularly beneficial for controlling household trash and promoting food security through backyard agriculture. This bio cyclo invention makes yard farming more profitable and beneficial for the environment Sumardjo et al., 2022; Sumardjo et al., 2019).The invention of bio-cyclo farming aims to create a waste management system based on the 3Rs of reducing, reusing, and recycling by creating a clean and waste-free environment and boosting family food security. In order to suit the demands of urban residents, yard agricultural operations might take the shape of product production, product processing, marketing, and the manufacture of biofuels (Kaufman &Bailkey, 2000; Linwattana, 2013).

Community participation in managing waste is still low, so the sustainability level of waste management is also low. This low participation is related to the low capacity of the community in the application of waste management innovations, so it becomes one of the causes of unmanaged waste(Tentama et al., 2017). From the perspective of development counselling, the waste problem cannot be separated from the behavior of the community as waste producers themselves. In order to change people's behavior and encourage them to manage garbage in their own homes, numerous waste management technologies are implemented as part of community empowerment in waste management. The idea of community empowerment refers to a process of increasing people's potential and skills so that they may better serve their communities' needs and solve problems on their own (Sumardjo et al., 2022). Community empowerment's ultimate objective is the creation of self-reliant, successful, and honorable people and society (Joo et al., 2020; Malapit et al., 2020; Sumardjo et al., 2014)

The transformation in question is a change from the previous paradigm, which places a premium on technology transfer, to the new paradigm, or "farmer-first approach," which gives priority to human resources (Chambers et al., 1994; Sadono, 2008). The effectiveness of program implementation, environmental support, farmer characteristics, and the reliability of the instructional process all influence community empowerment.The empowerment of the community affects the application of agricultural technology, business sustainability and food security(Aminah, 2019; Euriga et al., 2021; Sudarko et al., 2020; Sumardjo et al., 2019, 2021; Suryani et al., 2017). The novelty of this study is behavior change as a result of community empowerment based on bio-cyclo farming that integrates domestic waste

management and urban farming to support food security. This study aims to analyze behavior change through community empowerment based on bio-cyclo farming innovation.

B. METHOD

The study uses a quantitative methodology, which is enhanced by qualitative information. While qualitative information was gathered through observations, participant observations, and in-depth interviews with informal participants in bio-cyclo agricultural empowerment initiatives, quantitative information was gathered through organized interviews using questionnaires. The population in this study consists of farmers who participate in Pertamina EP at Zone 7's CSR Program and engage in bio-cyclo farming. The unit of analysis in this study is an individual member of the farmer group applying bio-cyclo farming. The respondents are selected using a census(Singarimbun& Effendi, 1989), where all farmer group members become research respondents.The number of respondents was 102 people.The research locations were in 5 villages, namely Bongas Wetan (Majalengka), Karawang Kulon, Plawad and Pasirjaya (Karawang), and Pringkasap Village (Subang). All research sites are located in West Java Province, Indonesia. The collection of research data was carried out in July-August 2022. The research variables arecommunity participation, facilitator capacity, community behavior change and community empowerment rate.Data processing and analysis were carried out in a descriptive and correlational manner with the help of the SPSS Version 27.

C. Results and Discussion

Characteristics of Respondents

In this study, 102 biocyclo farming farmers participated as responders. The characteristics of respondents were seen from age, formal education, and gender. The youngest respondents were 18 years, and the oldest at 62 year, averaging 39.17 years. The age of respondents in this study was categorized into 4 categories: < 35 years, 36-45 years, 46-55 years, and > 56 years. Based on this category, the age of most respondents at the age of < 35 years was 38.2 percent. For the respondents' gender, 57.8 percent were women. As for the formal education of respondents, 36.3 percent attended formal education for 9-12 years, meaning they graduated from high school. Table 1 presented information on the characteristics of the respondents.

Table 1. The Distribution of Respondents' Characteristics(n=102)

Characteristic	Category	Frequency	Percent
Age	< 35	39	38.2
	36-45	37	36.3
	46-55	22	21.6
	>56	4	3.9
Sex	Men	43	42.2
	Female	59	57.8
Formal Education	< 6 years	27	26.5
	7-9 years	29	28.4
	9-12 years	37	36.3
	> 12 years	9	8.8

Innovation of Bio-cyclo Farming

Bio-cyclo farming, also known as an integrated organic farming system, is an agricultural practice that makes use of the biological cycle and the waste products of both livestock and fish as well as residential trash that has been recycled by the community (Agus et al., 2020; Dwikoranto et al., 2015; Sholichah & Wahyuni, 2019). The usage of bio-cyclo farming is particularly

beneficial for controlling household trash and promoting food security through backyard agriculture. This invention uses organic waste from domestic household garbage, such as rice washing water and leftover vegetables, fruits, and rice. Bio-cyclo farming, also known as sustainable organic farming, is essential to the production of food as well as to improving quality of life for current and future generations(Cristache et al., 2018).

Liquid organic fertilizer (LOF) was produced at the research site using the bio-cyclo farming technique. LOF is a liquid fertilizer created by fermenting organic materials for 7–14 days, including fruit peels, fruits, vegetables, a bran/flour blend, fertilizer components, compost, and microbes. LOF is used as fertilizer to feed plants and strengthen the soil. To make LOF, follow these steps: (1) Fill the bucket with water to a volume of 1/3, add the rice-washing water and the coconut water, and (2) add the solids, making sure they sink. In a measuring cup or container, combine the molasses, bran, and bio activator/LOF; (3) Fill the fertilizer bucket with solid fertilizer or manure, tighten the bag's tie, and add LOF and NPK; (4) Stir thoroughly and check that everything has dissolved. After entering all the ingredients, add water up to 90–95% of the total volume. (5) Tightly and completely seal the bucket. Ensure that it is opened and shut again every three days (gas exhaust). (6) If there is no gas and the scent of tape is pleasant, it is expected that it will take 7 to 14 days; longer, up to 30 days, is preferable. (7) Harvesting: filter the LOF solid waste (which can be composted), then filter the LOF solution using a t-shirt or other cloth, deposit the LOF solution in a container, and store it somewhere that isn't exposed to direct sunlight.

Community Participation in Bio-cyclo Farming Empowerment

Community empowerment can be interpreted as developing the community's active participation (Sumardjo et.al. 2020). Participation is an important component in the process of community empowerment (Méndez-Barrientos et al., 2020; Peng et al., 2020; Sumardjo et al., 2021). The active involvement of the community in the empowerment process causes him to be more proportionately able to pay attention to his life to acquire self-confidence, self-esteem, and knowledge to develop new skills. The higher the insight, the more motivated a person's skills are to participate in developing more and more.

The community participation rate in bio-cyclo farming-based empowerment programs is 80 percent active and very active, and 20 percent turned out to be less active. This figure (80 percent) indicates that the community participation rate is good. This figure means that the community has understood the program, both regarding the objectives, processes, and benefits. This good level of participation also indicates that there has been an opportunity, willingness, and ability of the community to participate. There is an opportunity, namely, for the community's awareness and the opportunity to participate. That is, a desire or positive attitude towards hope (*ideals*) and the realization of that hope so that this attitude will encourage community action to realize those common expectations. Ability, namely, the community's awareness that he feels he can seize opportunities and with a strong will to realize these expectations. This capacity, among others, is characterized by the possession of abilities, energy, thoughts, resources, and materials to contribute to the realization of community expectations. The declaration of one of the societies listed here:

"In this program, we are always given the opportunity to express opinions or proposals for the implementation of the program. Furthermore, we also received bio-cyclo farming trainings before the program was implemented even today. That way, we can participate more in this program, because we understand the purpose of the program, we know how it is implemented, and if there are any difficulties the companion is also with us (Mm, group member, 50 years old)."

Participation in this entails taking part in the planning or decision-making process, carrying out actions, and overseeing and evaluating those activities. Some residents do not participate (about 20 percent); they generally do not understand the program well; the most important thing is that it concerns the goals to be achieved in the empowerment so that their creativity and initiatives to realize the goals of empowerment are less growing. Participation in terms of planning and implementing empowerment programs turns out to be in line with an understanding of the benefits of the conditions to be realized in empowerment so that motivation, initiative, and creativity development in realizing the benefits of the empowerment program. Data on participation in community empowerment projects were shown in Table 2.

Table2. Community Participation Rate in Community Empowerment Program based on Bio-cyclo Farming

Participation Rate	Participation	
	Number	Percent
Inactive	0	0
Less	12	11.8
Active	61	59.8
Very Active	29	28.4
All	102	100.0

Capacity and Role of Program Assistants in the Process of Community Empowerment through Bio-cyclo Farming

The facilitator's skills are crucial in initiatives that promote community empowerment. Capacity provides the context for an object or person's performance, ability, capability, and qualitative potential(Liou, 2008). Millen inFatchiya (2010) defines capacity as the ability of an individual, organization, or system to carry out precisely its functions effectively, efficiently, and sustainably. Capacity also relates to the performance set, and the precision in carrying out functions and tasks, for example, the degree to which a person contributes to achieving the goals set. UNDP (1998) defines capacity as the propensity of a person, group, or society to execute out its duties, deal with issues, and arrive at long-term objectives(Fatchiya, 2010).

Based on the perceptions of the program recipients, the capacity of community empowerment program assistants is 53.9 percent, categorized as good; even 44.1 percent think it is excellent. This information shows that the facilitator has performed his functions and roles well. These roles provide information and consultation, guidance, and assistance according to the interests of farmers, with a professional approach, satisfying farmers, egalitarian humanistic (equality), and democratic (Demon et al., 2018; Halimah&Subari, 2020; Sulandjari et al., 2020; Sulandjari& Yusuf, 2020). Table 3 shows the role and capacity of community empowerment program assistants.

Table3. The Role and Capacity of Facilitators for Bio-cyclo Farming-Based Empowerment Programs

Category	Role		Capacity	
	Number	Percent	Number	Percent
Bad	0	-	0	0.0
Less	2	2.0	2	2.0
Good	62	60.8	55	53.9
Excellent	38	37.3	45	44.1
All	102	100.0	102	100.0

Change Behavior: Knowledge, Attitudes and Skills

Community empowerment based on bio-cyclo farming turns out to be able to change people's knowledge, attitudes, and skills (Table 4). This condition is in line with the primary goal of community empowerment, which is to change community behavior regarding knowledge, attitudes, and skills.This result is in line with the research of (Jiumpanyarach, 2021; MacLeod et al., 2022; Santaweesuk et al., 2020), which states that organic farming behavior can be seen from the aspects of knowledge, attitudes, and skills of farmers.

Table 4. Changes in People's Knowledge, Attitudes and Skills

Categories of Change	Knowledge		Attitude		Skills	
	Number	Percent	Number	Percent	Number	Percent
No change	0	-	2	2.0	0	0.0
Low	1	1.0	10	9.8	2	2.0
High	53	52.0	34	33.3	62	60.8
Very High	48	47.1	56	54.9	38	37.3
All	102	100.0	102	100.0	102	100.0

Community Empowerment Rate

The community empowerment rate of 59.8 percent belongs to the high category; even 28.4 percent belongs to the very high category (Table 5). This means that participants have filtering power and competitiveness in managing their farming business. It also illustrates that people have the ability to decide the best for their farming business and manage it effectively and efficiently according to the market needs of their farming products. In the empowerment, participants who belonged to the independent category, in addition to having high filtering power and competitiveness, also turned out to have high partnership power. This partnership power illustrates that the community can maintain trust and partnerships with related parties in farming, especially in marketing its farming products(Sumardjo et al., 2019, 2022; Sumardjo, Firmansyah, and Manikharda, 2020; Sumardjo et al., 2020).

Table5. Community Empowerment Level of Bio-cyclo Farming

Category	Empowerment Level	
	Number	Percent
Low	0	0
Midle Low	12	11.8
MidleHigh	61	59.8
Very High	29	28.4
All	102	100.0

Community Participation, Facilitator Capacity and Community Behavior Change

The level of community participation and the capacity of empowerment program assistants showed a significant positive correlation with changes in community behavior related to community knowledge, attitudes, and skills. Knowledge is an essential factor in changing people's behavior (Euriga et al., 2021). This shows that the more participatory an empowerment program is carried out, the higher it will bring changes to community behavior. On the other hand, increasing the capacity of the facilitator will increase the change in community behavior, both aspects of knowledge, attitudes, and

skills of the community. Table 6 presents a correlation between the level of participation, the capacity of the community, and changes in community behavior.

Table6. Correlation Coefficient of Community Participation Rate and Facilitator Capacity with Changes in Community Behavior

Aspects of Community Empowerment		Correlation Value		
		Knowledge	Attitude	Skills
Capacity	Correlation Coefficient	.460**	.215*	.476**
	Sig. (2-tailed)	.000	.030	.000
	N	102	102	102
Participation	Correlation Coefficient	.241*	.294**	.259**
	Sig. (2-tailed)	.015	.003	.008
	N	102	102	102

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

Community Participation, Facilitator Capacity and Community Empowerment

The level of community participation and the capacity of empowerment program assistants show a positive and significant correlation with the level of community empowerment. It means that the level of community empowerment is in line with the increase in community participation and the capacity of empowerment program assistants. The more participatory an empowerment program is, the higher the level of community empowerment. Furthermore, the more capacity of the empowerment program assistants will increase the community empowerment level. This is in line with the research Haryanto et al. (2020); Sawitri et al. (2020); Sudarko et al. (2020a) that the capacity of the facilitator affects the empowerment level of the community. Table 7 presents the relationship between the level of participation and the capacity of the community with the empowerment of the community.

Table7. Correlation Coefficient of Community Participation Rate and Facilitator Capacity with Community Empowerment

		Capacity	Participation	Community Empowerment
Capacity	Correlation Coefficient	1.000	.259**	.403**
	Sig. (2-tailed)	.	.008	.000
	N	102	102	102
Participation	Correlation Coefficient	.259**	1.000	.243*
	Sig. (2-tailed)	.008	.	.014
	N	102	102	102
Community Empowerment	Correlation Coefficient	.403**	.243*	1.000
	Sig. (2-tailed)	.000	.014	.
	N	102	102	102

**. Correlation is significant at the 0.01 level (2-tailed).

		Capacity	Participation	Community Empowerment
Capacity	Correlation Coefficient	1.000	.259**	.403**
	Sig. (2-tailed)	.	.008	.000
	N	102	102	102
Participation	Correlation Coefficient	.259**	1.000	.243*
	Sig. (2-tailed)	.008	.	.014
	N	102	102	102
Community Empowerment	Correlation Coefficient	.403**	.243*	1.000
	Sig. (2-tailed)	.000	.014	.
	N	102	102	102

*. Correlation is significant at the 0.05 level (2-tailed).

The ability of program facilitators to inspire the community by converting awareness of the real requirements into the felt needs of the community is a criterion for increasing the effectiveness of bio-cyclo farming empowerment. Leadership support for empowering community food security is beneficial to increase farmers' participation in the empowerment process. As a bridge for the input of crucial information and as a connection between farmer groups and connected parties, the leader transforms into the gateway to empowerment. This is consistent with the findings of Mutmainah and Sumardjo's (2015) study, which found that leaders play a crucial role in the growth of farmer organizations and in motivating their members to take part in empowerment activities (Mutmainah&Sumardjo, 2015).

The findings demonstrated that the intensity of the empowering agent's or facilitator's role has a significant impact on the degree of community empowerment. This is because facilitators work professionally by applying the philosophy and principles of counseling, namely participatory and non-dominative, by applying the convergent communication paradigm. This is in line with the study of Aminah et al. (2015) that the intensity of empowerment agents and accuracy in the learning process of farmers are effective in increasing the level of empowerment of farmers in Halmahera (Aminah, 2019; Aminah et al., 2020).

Behavioral Change at the Community Level

Through the process of empowering bio-cyclo farming, it can transform agricultural practices in the community. Before empowerment, the community implemented conventional agricultural practices, namely agriculture using chemical fertilizers and pesticides. After the empowerment process, this habit shifted to environmentally friendly farming that uses bio-cyclo farming, which utilizes domestic organic waste. The new practices include the use of compost, the use of liquid organic fertilizers, the use of local micro-organisms (MOL), well as the application of hydroponics and organic verticulture in their respective yards. People are now consuming organic urban agricultural goods in the form of veggies like kale, spinach, mustard greens, and chillies, which is a good thing. Mango, crystal guava, blueberries, oranges, mulberries, and star fruit are just a few examples of the different kinds of fruit plants. Along with vegetables and fruits, there are also medicinal herbs, including bitter, mint, crimson, and lemongrass.

Another new practice transformation is the use of yards for agriculture. Before empowerment, the community tended to use less land, but currently, the yard is used for farming food crops. One advantage of planting in this yard is the availability of clean air in the form of oxygen from organic plant products in the yard or barren ground nearby the town.Another transformation occurred in

the use of digital media in the community. This digital media is used both in the learning process of organic and processed agricultural cultivation, as well as in the marketing of products. Through the mentoring process, people learn together using digital media, such as youtube, websites, and marketplaces.The process of farmer education and online product promotion are strongly supported by the usage of information technology media (Dharmawan et al., 2020; Osumba, 2021; Osumba et al., 2021; Palanisamy& Bharadwaj, 2018).

D. CONCLUSION

The process of empowering bio-cyclo farming has resulted in various changes, both at the individual and community levels. Changes at the individual level are changes in behavior, including knowledge, attitudes, and skills of society. Change at the community level is using new social practices in society. The new practicesare (1) Bio-cyclo farming innovations. (2) Using yards for food production. (3) The use of digital media to increase knowledge of agricultural cultivation and marketing of agricultural products. These change are conditioned through a participatory empowerment process, with a dialogue and convergent communication approach involving program facilitator.

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Conflict of Interest Statement

This research is basic research science and does not contain any conflict of interest.

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