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THE ROLE OF AGRICULTURAL INSTITUTIONS IN PROMOTING COMMUNITY INVOLVEMENT IN FERTIGATION IN COMMUNITY GARDENS

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ABSTRACT

The rising costs of living, the increasing trend of healthy lifestyle and limitations of agricultural area led to the introduction of community garden. Nevertheless, the low level of community knowledge and expertise by using technology in cultivation forces communities to continue cultivating crops using their existing experiences. Therefore, this study examines the role of institutions in increasing community involvement by utilizing fertigation methods to cultivate in community gardens. A quantitative study was conducted on 50 respondents in Kampung Gali Hilir, Pahang. In general, agripreneurs agree that agricultural institutions play a crucial role in providing information and assistance on fertigation cultivation through courses and training, providing agricultural inputs and conducting related programs. There is a need to strengthen the institutional approaches, thereby increasing farmers' participation in new methods introduced. This to ensure that the community receives the benefit of new methods, as well as the sustainability of community garden and environment.

Contribution/ Originality: The current work contributes to the existing literature reviews that focus on the role of agricultural institutions in increasing the participation of agripreneurs to engage in the new methods introduced. Thus, the role of agricultural institutions needs to be strengthened so that the benefits of using technology in community garden can be disseminated.

1. INTRODUCTION

In the aftermath of the Covid-19 pandemic that hit worldwide, many were negatively affected in terms of their sources of income and employment [1]. Combined with the increasing cost of living, the increasing prices of food

necessities trigger major challenges among the population, especially urban dwellers [2]. Furthermore, the increasing trend of healthy lifestyle practices that is gaining the attention of the public is further increasing the demand for healthy, fresh, chemical-free, and high-quality foods. In order to reduce the burden of the cost of living on the population's demand for quality food, community garden farming using technology, such as fertigation in order to grow fresh food, such as vegetables, is the best alternate.

The practice of community gardening (urban farming) involves the production, processing, and distribution of food, as well as other products through intensive cultivation and livestock in the city and nearby areas [3, 4]. The purpose of this concept was to reduce the burden of the rising costs of living, especially for urbanites and suburbanites, as well as to meet the needs and demands of the population for healthy and fresh foods [5]. Community gardens can reduce agricultural constraints such as infertile soil, unpredictable weather, and lack of appropriate technology [6, 7]. food, population health, social capital, local ecology and the environment [8, 9] as well as opportunities for community development through education, training, and employment [10]. Generally, community gardens are developed in developed countries with the emphasis on involving the population and are adapted to the participation of a variety of institutions and voluntary organizations as tools for redevelopment, strengthening social ties, and overcoming health problems [11]. By collaborating with the institution through extension agents, the community can enhance the skills and information of farmers as well as increase production [12]. Since its introduction in 2013, community gardens have demonstrated a significant increase in community participation in Malaysia. It is intended to reduce the cost-of-living burden associated with rising food prices and food insecurity. Indirectly, it contributes to the greening of the local area as it improves the landscape as well as lowers the temperature of the local environment [13, 14]. Although, there are a number of issues to consider including limited operating space, infertile soil, weather uncertainty, lack of information, the level of technology used, as well as environmental pollution as a result of farming activities. The development of organic agriculture, the introduction of new rules and private standards as well as technological innovations should be considered in order to minimize the negative effects on the environment while increasing crop productivity [15, 16].

As such, the introduction of more efficient technologies to be utilized by the community, including through fertigation methods in community garden agriculture, should be encouraged. Despite its relatively high start-up costs, this technology is able to produce high yields and high-quality crops. In addition, fertigation methods can provide a quick return on capital, reduce labor consumption, and provide ease of management of the crops by facilitating fertilizer input, pest, disease, and weed control [17]. Nevertheless, the low level of community knowledge and expertise regarding technical management, as well as the high start-up costs for the development of irrigation systems, forces communities to continue cultivating crops using their existing experiences and commercial irrigation methods that are available on the market [18]. To address these constraints, institutions and other stakeholders should play a more effective and efficient role in increasing farmers' involvement in fertigation community gardens. To what extent does the involvement and support of the institution within influence community participation in fertigation cultivation in community garden farming? Therefore, this study examines the role of institutions in increasing community involvement by utilizing fertigation methods to cultivate community gardens.

2. LITERATURE REVIEW

Community or resident involvement can be defined as the process of involving beneficiaries in influencing the direction of local development projects [19]. A population-based approach requires active participation and the ability to influence the success or failure of a program. Moreover, community involvement plays an important role in training and accustoming them to perform work related to the project independently, as well as being able to make follow-up actions. Azlizan and Hamzah [20] report that community involvement in an organized activity can promote sense of responsibility and common sense. Therefore, this community garden activity can create a sense of

pride for the residents toward the efforts implemented, as well as a commitment to defend and continue other efforts and actions in the future. However, efforts to involve local residents in a program held are influenced by various factors, such as employment, education level, and income level, as well as institutional involvement [21].

Participation of agricultural institutions, as well as other stakeholders in an agricultural program is very important in influencing the participation of the farming community. The lack of financial funding, incentives, and subsidies for technology and market development can lead to the closure of operations [22-24]. Consequently, the development management costs for the introduced methods and the management of resources are high. The participation of smallholder farmers with other farming communities can increase production yields, expand new crops, and increase household income through the sharing of knowledge and experience. In fact, farmers will be supplied with inputs, technical assistance, and market guarantees as well as inputs, technical assistance, and market guarantees for agricultural products by the government [25]. Farmers' exposure to agricultural extension services, such as capital assistance and production input subsidies as well as advisory services, can help them develop more efficient crop management methods [26-28]. In fact, expansion agents also provide farmers with crop inputs, labor, grading, packaging, storage, and transportation, which are critical for production [29].

Based on a study by Rosmiza, et al. [21] institutional factors play an important role in determining farmer participation in expansion programs and the introduction of new techniques. An absence of institutional support, policies that do not focus on the program, a lack of promotion, the lack of knowledge and skills among development officers, and inefficiency in management on the part of the institution hindered the development of the agricultural sector. The importance of institutional participation is evident in the fact that most farmers lack the capital to implement new methods, especially those that use the latest technology, which typically entails high start-up and management costs. In order to implement an integrated and efficient approach at the institutional level, a range of measures need to be implemented, including strong institutional support, more efficient policy planning, as well as systematic and continuous promotion is able to understand, further increasing farmer involvement in new programs and methods introduced by the government [30]. The role of policies in contributing to the sustainability of rural agricultural development and the achievement of global competitiveness is widely recognized. Based on Limbo [31] study of contract farmers in the Philippines, the government has set standards that are to be met when land is assigned to farmers for agricultural purposes. Wu, et al. [32] the Chinese government's full supportive policy towards the agricultural sector has impacted three main mechanisms, namely scale, structure and technology. Encouragement from the government resulted in increased use of fertilizers on crops, in addition to encouraging farmers to expand crop areas (scale effect). In terms of the structural effect, some policies are able to reduce the use of fertilizer, but also encourage farmers to increase the area under cultivation. Furthermore, the provision of subsidies indirectly has a more significant impact on the decisions made by farmers with regard to farm management and the environment. To achieve continued success and increased participation from the farming community, a variety of aspects must be supported including: support services, extension agents, technologies, soft loan loans, subsidies for fertigation system setup [33] Good Agricultural Practices (GAP), business and contracts management, legal services, marketing, trading assistance, and responsible private sector investments [31].

The National Agro-Food Policy 2.0 in Malaysia also emphasizes modern agricultural practices such as fertigation. The goal is to address issues such as productivity, production costs, and labor dependency. As a result, in order to increase community involvement, various forms of incentives have been channeled to farmers, including agricultural inputs, in-kind contributions, and development of farm infrastructure [34]. The Malaysian Agricultural Research and Development Institute (MARDI), for example, introduced FERTIKIT, a mini-fertigation system with a more attractive, practical and portable design in line with the 3M principle, i.e., Easy, Economical and Friendly [17]. Additionally, the Malaysian Nuclear Agency has conducted a technology application program with the community through fertigation chilli cultivation. It is intended to increase community involvement through the transfer of knowledge and technology, and to foster modern agripreneurs cultivating

high-value, sustainable crops without land use [35]. The Shah Alam City Agriculture Program employs Smart-Fertigation Technology to reduce care problems and production costs, particularly for commercial-scale crops, according to Zulkiflee and Waiz [36]. By working closely together, more communities in the city have been encouraged to use this technique in their homes.

Zaidi, et al. [37] concluded that for agricultural development projects to succeed with the community, relevant organizations and agencies must play an important role in the consultation process and project-related advice. Farming communities require advisory services and guidance regarding the adoption of appropriate agricultural technologies such as crop care, pest control, and crop diseases [14, 38]. The Department of Agriculture is the main agency providing guidance and advisory services to urban gardeners as part of the implementation of the Urban Agriculture Program with the participation of the local community. In addition, it involves the use of appropriate agricultural technology such as crop care, pest control, and crop diseases [38] project start-up assistance in the form of money and equipment such as pots or polybags, plant media, fertilizer, and tree seeds [37]. Concentrated efforts and ongoing guidance have been successful in increasing community involvement in collectively growing crops. The projects make use of electronic media delivered by institutions and other stakeholders. Abang, et al. [39]; Kabirigi, et al. [33] and Rosmiza, et al. [21] found that farmers will become familiar with a method via training, courses, programs in electronic media such as radio and television, as well as demonstrations and field visits. In promoting a method or product, institutions play a large role since the delivery of information through promotion is more widespread, particularly in the process of technology transfer. As a matter of fact, ICT has enabled the implementation of agricultural activities as well as increased food production and distribution [40, 41]. Community participation will be influenced by effective delivery of services [30].

Nevertheless, the agricultural sector continues to face significant challenges, especially when it comes to the understanding and implementation of sustainable agricultural practices by farmers, stakeholders, and the strengthening of government policies. So, the use of new and high-tech approaches should be emphasized comprehensively in agricultural development. Among these are aspects of Research and Development, agricultural education as a means of expanding the notion of sustainable agriculture, quality of life for farmers and their health well-being [42, 43].

3. METHODS AND STUDY AREA

Using a quantitative approach, this study examines the factors that hinder the participation of local communities in the cultivation of crops by fertigation. In addition, the study evaluates the role of stakeholders in increasing the involvement of local communities in fertigation crops. A simple random sampling was used to select the study sample. The study involved 50 participants from a community that cultivates vegetables by fertigation in the village of Gali Hilir in Raub, Pahang, Malaysia. The Kampung Gali Hilir is located in the Gali 2 sub-district, where there are 13 fertigation sites.

As a data collection instrument, questionnaires were used. This questionnaire was in the form of a 5-likert scale, namely 1-Strongly Disagree, 2-Disagree, 3-Disagree, 4-Agree, and 5-Strongly Agree. Using frequency, percentage, and mean, descriptive analysis was used to obtain the results of the study. The mean scores obtained were interpreted based on low (1.00-2.33), medium (2.34-3.66) and high (3.67-5.00) levels.

4. RESULTS AND DISCUSSION

4.1. Profile of the Respondents

In this study, there were 50 respondents have been interviewed, including fertigation plant operators in Gali Hilir, a village in Raub, Pahang. The total number of males was 56 percent (28 people), and the total number of females was 44 percent (22 people). The highest number of people was found in the 20-29 age category, which was 19 people (38%). We then have the age group of 40 to 49 years with 13 people (26%), followed by the age group of

50 years and older with 12 people (24%). It was the age group of 30 to 39 years that had the lowest number of six individuals (12%). There is no doubt that the youth use fertigation methods more than the older generation. Malays constitute the majority of respondents (96%), while Chinese and Indians each contributed one respondent (2%). The majority of respondents in the study area are Malay, while the Chinese and Indians are minorities.

According to the majority of respondents, cultivating this type of fertilizer is not their primary occupation. According to the study, the majority of respondents (26%) work for the government. Many respondents own their own businesses, such as restaurants and grocery stores (20%). Another group of respondents work part-time in the private sector (16%), as planters or rubber tappers (16%), and as students (6%). There were nine unemployed respondents (18%).

4.2. Agripreneurs' Perspectives on Increasing Community Involvement in Fertigation Methods in Community Gardens

Institutions engaged in agriculture play an important role in mobilizing community participation for fertigation cultivation. Using fertigation methods, Table 1 illustrates the various roles and initiatives given to communities to encourage their involvement in community garden farming. As part of this effort, agricultural institutions provide training and courses to crop operators, provide capital, equipment, and agricultural inputs, as well as act collectively with the community.

Table 1. Agripreneurs' perspectives on the role of agricultural institutions in increasing community involvement in fertigation cultivation in community gardens.

Agripreneurs' perspectives on the involvement of agricultural institutions	1	2	3	4	5	Mean
Provide courses and training related to fertigation cultivation methods	-	1 (2%)	7 (14%)	39 (78%)	3 (6%)	3.74 (High)
Provide agricultural inputs (seeds, fertilizers and pesticides) for free	-	1 (2%)	12 (24%)	37 (74%)	-	3.72 (High)
Carry out programs related to fertigation cultivation methods	-	1 (2%)	20 (40%)	29 (58%)	-	3.56 (Moderate)
Opening new planting areas to cultivate crops by fertigation	-	2 (4%)	23 (46%)	23 (46%)	2 (4%)	3.50 (Moderate)
Distribute fertigation equipment assistance (polybags, water pumps, water tanks, pipes)	-	6 (12%)	28 (56%)	16 (32%)	-	3.20 (Moderate)
Make monitoring of planting	-	8 (16%)	34 (68%)	8 (16%)	-	3.0 (Moderate)
Provision of capital resources in the form of money	-	13 (26%)	29 (58%)	6 (12%)	2 (4%)	2.94 (Moderate)
Encourage agripreneurs to cultivate crops by fertigation	-	9 (18%)	27 (54%)	13 (26%)	1 (2%)	3.12 (Moderate)
Agricultural agencies participate fully with the community	-	3 (6%)	39 (78%)	6 (12%)	2 (4%)	3.14 (Moderate)
Total Mean						3.28

Note: 1 = Strongly disagree; 2 = Disagree; 3 = Disagree; 4 = Agree; 5 = Strongly agree.

A total of 29 people (58%) agreed that the institution runs various programs. A total of 39 agripreneurs (78%) agreed, and three participants (6%) strongly agreed that agricultural institutions provide courses and training related to the cultivation of fertigation methods to the local community. In this manner, the local community will gain a better understanding of the advantages of working on fertigation methods in more depth. A total of seven individuals (14%) disagreed with the statement, followed by one individual (2%) who disagreed. The mean score for this statement is 3.74, which is considered high for this statement (Table 1). The authors of Abang, et al. [39]; Kabirigi, et al. [33] and Rosmiza, et al. [28] demonstrate that farmers will be more likely to adopt an agricultural method when they have extensive exposure and an in-depth understanding through training, courses, demonstrations, and field visits, as well as program promotion through electronic media.

The high mean score of 3.72 was also attained by agricultural institutions who provided agricultural inputs such as seeds, fertilizers, and pesticides free of charge to participants. In total, 37 respondents (74%) agreed, while 12 respondents (24%) disagreed, and one respondent (2%) disagreed (Table 1). Free agricultural inputs are much needed, particularly for agripreneurs who are just beginning their career in the sector. Through the assistance provided, the cost of preparing material for fertigation cultivation can be reduced. Interestingly, the results of this study are in agreement with those found in Haliza [38] and Zaidi, et al. [37] who have found that continuous guidance and equipment assistance can increase community participation in cultivating crops by fertigation. Fertigation methods are intended to enhance community understanding. In contrast, 20 people (40%) disagreed and one person (2%) disagreed with the statement. (Table 1) indicates that the mean value is 3.56, which is at a moderate level. The organized programs were not widely conducted and did not receive an encouraging response from the community. There are still many communities that are unaware of the existence of programs conducted in the surrounding area. The involvement of institutions in understanding agripreneurs and communities on the benefits and methods of fertigation crop management needs to be enhanced, as noted by Abang, et al. [39]; Kabirigi, et al. [33] as well as Rosmiza, et al. [21] pertaining to the production process. Moreover, two-way communication will facilitate communication within the institution. during cultivation. Only 16 respondents (32%) agreed with this statement. According to Table 1, the mean is 3.20 (moderate). The study found that start-up equipment is very much needed by operators since the start-up cost of fertigation methods is high. Fatimah and Muhamad [13] found that government agencies also offer initiatives such as financial assistance and equipment for community gardens, such as polybags, soil media, fertilizer, and tree seeds.

In total, 25 respondents (50%) agreed that the institution should open new planting areas for the community to utilize for fertigation crops. 23 people (46%) disagreed and 2 people (4%) disagreed with the statement (Table 1). The mean score is 3.5, which is at a moderate level. Most fertigation operators operate independently. In spite of this, the institution provides a venue for the community to learn about fertigation crops. This conclusion is supported by the study of Fatimah and Muhamad [13] who state that the institution actively encourages communal work activities and clean-up of open spaces by the community to be used as a community garden.

A total of 34 respondents (68%) disagreed that agricultural agencies are involved in monitoring the fertigation crops cultivated in the study area. Eight respondents (16%) disagreed. These results suggest that the authorities are not regularly monitoring the study area. The majority of planting activities are managed entirely by the operators. Eight respondents (16%) agreed with this statement. As stated, the mean value for this statement is 3.0, which is a moderate value. This is not in agreement with the statement made by Eliwa [26] and Idowu [27] who concluded that face-to-face or two-way communication between agricultural development agents and farmers is the most effective means of influencing farmer involvement, deepening crop management problems, and improving information. Capital plays an important role in the production process. In relation to this study, initial assistance will be provided to applicants who wish to initiate and actively participate in community gardens. Thus, the start-up capital provided can reduce the cost of purchasing the fertigation method equipment. A total of 35 respondents (70%) agreed that capital resources are provided to agripreneurs in the form of money. There were 13 people (26%) disagreed with the statement, while two people (4%) disagreed with it. The mean is 3.48, which is moderate (Table 1). A study by Koh and Hoi [22]; Kishore, et al. [23] and Kopetz [24] found that enterprises were unable to function properly when they lack adequate financial funding, incentives, and subsidies for technology and market development.

Respondents were less in agreement with the statement that the institution encourages fertigation crops, with 54 percent agreeing and 18 percent disagreeing. The results of the study indicate that institutions do not continually encourage agripreneurs to implement crops through fertigation. As a result, the level of community involvement in fertigation will be impacted. Only 13 participants (agree) and one (strongly agree) supported this statement with a mean score of 3.12 (moderate) (Table 1). Ideally, the institutions should work with the community

in order to attract them to be actively involved, as well as be able to reduce crop management problems, as stated by Zulkiflee and Waiz [36].

Approximately 78 percent of agripreneurs disagree and 6 percent disagree that agricultural institutions participate comprehensively in encouraging community involvement in undertaking fertigation methods. Only eight respondents (16%) agreed with the statement. The mean value of this statement is 3.14, which indicates a moderate level (Table 1). There is evidence of this in the fact that the involvement of communities in the study area in fertigation cultivation is still low and it is not practiced on a large scale. Most agripreneurs run small and medium-sized fertigation farms. In this regard, the government should play an active role and begin to consider more effective ways to encourage community participation in sustainable agriculture, particularly through the use of fertigation crops, as stated by Haliza, et al. [42] and Smit, et al. [43].

To summarize, the total mean is 3.28, which is at a moderate level (Table 1). As a result of the research, it is evident that the efforts made by the institution in encouraging local communities to cultivate crops by fertigation are still at a moderate level and have not received much attention. Due to the fact that many communities are still unaware of the existence of fertigation cultivation programs conducted in their vicinity. There is no doubt that the programs organized by agricultural institutions are not extensive and regularly conducted. This affects the community's involvement in fertigation cultivation due to the fact that the community has not been fully exposed to fertigation cultivation's advantages. As described by Bridhikitti and Kanokkanjana [30] using clear and effective delivery methods will increase community acceptance and participation. Therefore, the role of the institution is extremely important to ensure that all efforts are more effective in order to attract the local community to cultivate crops using the best methods, as well as increasing production yields and creating a secure environment.

5. CONCLUSION

Agripreneurs are becoming more involved in fertigation cultivation in Malaysia because this method has been shown to improve crop yields as well as provide additional income for agripreneurs. Nevertheless, the results indicate that the community is not as involved in the use of fertigation methods in cultivating crops as they could be due to lack of knowledge and skills when it comes to applying fertigation methods, as well as the high initial cost of providing fertigation equipment and technology. There is a lack of knowledge among these crops and others. As a result, institutions and other stakeholders must play a role in approaching agripreneurs and the community collectively and periodically. As a result, information and agricultural development processes, such as advisory services and assistance can be delivered effectively and widely. Support from institutions, such as capital, agricultural inputs, advisory services, courses, and training, can encourage more agripreneurs to cultivate crops by fertigation. Clearly, these efforts help agripreneurs in reducing the cost of crop production, producing quality products, and generating income for the business, improving the living standards of the people, as well as ensuring the sustainability of the agricultural environment.

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