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Level of perception on fertigation technology among Indigenous people in Perak, Malaysia

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Abstract

Fertigation technology has proven to be a successful method for enhancing crop yields by applying nutrients. It is cost-effective, easy to install, and simple to operate, which is why many farmers in Malaysia have adopted it. However, indigenous people have hesitated to use it due to negative perceptions. This study aims to determine the level of perception of indigenous people in Perak towards fertigation technology. The study uses a quantitative approach based on the Theory of Planned Behavior (TPB), with attitude, subjective norm, and perceived behavioural control as independent variables and perception towards fertigation technology as the dependent variable. A purposive sampling technique was used to select 150 respondents, and descriptive analysis was employed for data analysis. The findings demonstrate that the mean score for indigenous people's perception of fertigation technology was moderate (M = 2.7667, SD = 0.87774) including their attitude (M = 2.5875, SD = .94309). While subjective norm (M = 2.3343, SD = 0.90242), and perceived behavioural control (M =2.3933, SD = .86919) have a low mean score. These empirical findings provide valuable insights for policy-makers to help indigenous people adapt to modern technology and boost their economic growth, especially into actionable strategies that facilitate the adaptation of indigenous people to modern agricultural practices while respecting their cultural identity and promoting sustainable development.

1. INTRODUCTION

The technology of the fertigation system has been a commercially practiced fertilizer application method since the mid-20th century. Fertigation, as described by Shukla et al., (2018), involves applying fertilizers or plant nutrients through an irrigation system. This method efficiently dissolves chemical plant nutrients in water, delivering both water and fertilizer to the plant roots simultaneously. It offers cost savings for water and fertilizers, along with simplicity and ease of installation.

In the context of Indigenous people, there have been limited programs aimed at regrouping or rearranging communities, known as the regroupment scheme or locally as "Rancangan Pengumpulan Semula" (RPS) since 1980. The primary objective of this program was to ensure uniform administration among Indigenous communities and to focus more on agriculture as an industry. The RPS program continued during the Ninth Malaysia Plan (RMK 9) from 2006 to 2010, with a significant budget allocation of RM 14,444,000 in 2008. There is a total of 16 RPS villages in Malaysia, located in Pahang, Perak, and Kelantan (Seow et al., 2013). Despite the challenges faced, Indigenous people remain involved in the agriculture industry (Yusof et al. 2019). However, Indigenous people's knowledge about certain products and services, including modern agricultural technology, remains limited (Rosnon & Asnarulkhadi, 2018). The term "Indigenous people" in Peninsular Malaysia refers to the 'Orang Asli,' comprising three main groups: 'Negritos,' 'Senoi,' and the 'Proto-Malays' (Khor & Shariff, 2019), each with various sub-ethnic groups. Additionally, there are Indigenous people in West Malaysia, such as the 'Dayak' in Sarawak and 'Kadazan-Dusun,' 'Bajau,' and 'Murut' in Sabah.

According to Jabatan Kemajuan Orang Asli (JAKOA, 2021), Perak is home to the largest population of Indigenous people in Peninsular Malaysia, with 53,299 individuals. Despite their significant numbers, Indigenous people in Perak continue to grapple with poverty. Perak was chosen as one of the first states to participate in The Orang Asli Resettlement Programme, locally known as 'Rancangan Pengumpulan Semula' (RPS), due to its strategic location within the Titiwangsa Mountain range. The RPS program aimed to relocate Indigenous

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communities to facilitate administrative matters, but it has not effectively alleviated poverty (Yusof et al., 2019).

Samsudin et al. (2021) reported that most states in Peninsular Malaysia allocated 92.48% of land area (1420.85 hectares) for agricultural purposes for Indigenous people, with only 115.53 hectares designated for building purposes. This highlights the predominance of Indigenous people in the agriculture industry. Moreover, Indigenous people's education remains a challenge, with a high dropout rate, although it has decreased from 29.5% in 2000 to 21.8% in 2008 (Rosnon & Talib, 2019). Consequently, many Indigenous people continue to practice conventional farming methods. Additionally, there is a general resistance to adopting agricultural technologies (Joshi, 2019), and perceptions of such technologies remain poor (Jha et al., 2020).

This study aims to assess the perception of Indigenous people in Perak toward fertigation technology. It also seeks to support the government's goals, as outlined in the Twelfth Malaysia Plan, or 'Rancangan Malaysia Kedua Belas' (RMK-12), which focuses on reducing poverty and narrowing income gaps among Malaysians.

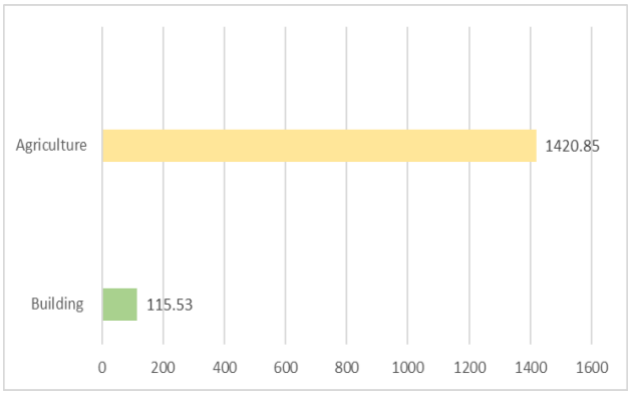

Figure 1: Land Property of Indigenous People in Peninsular Malaysia Source: Shamsudin et al. (2021)

1.1. Background of the study

Indigenous peoples in Malaysia, known as Orang Asli, constitute a diverse group of ethnic communities with distinct languages, cultures, and customary practices. Certainly, various programs and incentives have been implemented to support indigenous peoples in Malaysia, particularly the Orang Asli in Peninsular Malaysia. These initiatives aim to address socio-economic disparities, promote cultural preservation, and enhance the well-being of indigenous communities. However, it's crucial to ensure that such initiatives are implemented in consultation with indigenous communities, respect their customary land tenure systems, and address their specific needs and aspirations. Indigenous peoples possess ancestral wisdom and insights that have been acquired through generations of lived experience and close engagement with their natural surroundings (Tekken et al, 2017; Hollaus et al., 2022).

It is not accurate to say that most programs involving Indigenous peoples, including those related to agriculture, failed (Abas et al, 2020; Hollaus et al., 2022). However, it is true that historically, many programs and policies have not adequately addressed the needs and priorities of Indigenous communities, leading to limited success or even failure in achieving their intended goals. The main challenges that have been faced by programs involving Indigenous peoples are lack of consultation and collaboration, disregard for traditional knowledge, limited resources and support, colonial legacies, and inadequate capacity building (Bala et al., 2022). Besides, Indigenous peoples have faced cross-cultural communication issues and reluctance towards new technologies (Abas et al., 2020).

This study gathered information from 150 Indigenous people in Perak, Malaysia. To assess the extent of perceptions of fertigation technology among Indigenous people in Perak, the level of behaviour that the Indigenous people respond to the perception of fertigation technology must be identified. This research sheds light on the factors influencing Indigenous people's views on the fertigation system. It aims to identify the aspects that shape their perspectives on fertigation technology. Furthermore, this study has the potential to facilitate Indigenous peoples to adopt modern farming technology, thereby reducing income disparities with other communities and attracting government and non-governmental organizations (NGOs) to address their poverty issues. Additionally, this research aligns with the goals of the Rural Development Policy, which aims to improve the lives of people in rural areas. Since most Indigenous people reside in rural areas, this policy applies to them as well. Moreover, the study contributes to the achievement of Focus 5 within RMK-12, which addresses poverty and strives to build an inclusive society in Malaysia. Indigenous people in Peninsular Malaysia are a target group for government intervention due to their economic challenges and weaknesses in the delivery system (RMK-12, 2021).

As a result, the theory of Planned Behaviour (TPB) was used as the foundation for measurement. The framework depicts the interaction between dependent and independent variables. TPB is a behavioral theory that influenced by three main factors such as attitudes, subjective norms, and perceived behavioral control. This understanding can inform the development of culturally sensitive interventions and policies to promote the sustainable use of fertigation technology within Indigenous communities in Perak. Additionally, involving Indigenous community members in the research process and decision-making can enhance the relevance and effectiveness of interventions aimed at promoting technology adoption. Therefore, this article was written to identify the level of attitude, subjective norms, perceived behaviour control and the perception of fertigation technology among Indigenous people in Perak.

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2. MATERIALS AND METHODS

2.1 Research design

This study is descriptive, aiming to provide a comprehensive understanding of the subject matter. In this study, the dependent variable was the perception towards fertigation technology, while the independent variables were attitude, subjective norm, and perceived behavioural control.

2.2 Sample

According to Zamboni (2018), sample size is defined as the number of participants or samples that were used in a study. For this research, Indigenous people in Perak were selected as respondents. The total target for this research is 150 people among indigenous people who live in Perak. The accuracy of the sample size needs to be above 30 respondents and below 500 respondents (Roscoe, 1975).

2.3 Sampling Method and Procedure

The sampling procedure employed for this study was non-probability sampling, whereby not every member of the population was allowed to participate. This method was chosen due to the time and/or cost constraints that often make it unfeasible to draw a random probability-based sample. The sampling technique aimed to select a specific population capable of responding to the questionnaire (Saunder et al., 2021). Purposive sampling, a specific type of non-probability sampling, was utilized for this study. This method involves selecting elements based on the researchers' judgment, and can be particularly effective when the number of primary data sources is limited, and when aligned with the research design and objectives of the study. Additionally, it is a cost and time-saving approach (Dudovskiy, 2022). Utilizing purposive sampling for studying Indigenous people offers several advantages, including targeted selection, cultural sensitivity, in-depth exploration, representation of diverse perspectives, maximization of resources, community engagement, and empowerment. These advantages contribute to the production of research that is respectful, relevant, and valuable to Indigenous communities and stakeholders. Through structural interviews with local people of indigenous people, 150 respondents have been gathered for this study. Local people from indigenous communities have been used as moderating people in this study since indigenous people have communication barriers.

2.4 Instrument and Measurement

To obtain data from the participants, this research employs a questionnaire as the designated instrument of data collection. A survey instrument was developed to evaluate the indigenous population's attitudes, subjective norms, and perceived behavioural control towards fertigation technology. The dependent variable of the research is the respondents' awareness of fertigation technology. The survey instrument comprised three distinct sections: Part A, Part B, and Part C. Each division serves a unique purpose. Part A collects demographic data, including age, gender, and place of residence. Part B concentrates on the dependent variable, which is the indigenous population's perception of fertigation technology. Parts C, D, and E relate to the independent variable, which evaluates the indigenous population's attitude, subjective norm, and perceived behavioural control towards fertigation technology. A 5-point Likert scale was used for this study. The Likert scale is a widely employed psychometric tool in educational and social science research. Respondents indicate their level of agreement with a statement on a scale of one to five. The scale ranges from strongly disagree (1), disagree (2), neither agree nor disagree (3), agree (4), to strongly agree (5). Besides to ensure the stability or consistency of a measurement for this the pilot test has been carried out for 30 indigenous people in Perak. The finding of Cronbach's Alpha for all variables shows a value between 0.943 to 0.979 thus it indicates there is strong internal consistency reliability among the variables in this study. This study also involves researchers from local people of indigenous communities in Perak to avoid sensitivity issues or biases.

2.5 Data Analysis

The data was subjected to analysis using the Statistical Package for the Social Sciences (SPSS) version 26.0 to analysis also included an examination of the demographics of the respondents and the level of attitude, subjective norm, and perceived behavioural control of indigenous people in Perak towards fertigation technology. Additionally, frequency and percentage analyses were utilized to construct the demographic background of the respondents to provide a comprehensive overview of the sample population, which enhances the validity and generalizability of the study findings. Importantly, these techniques were used to establish a comprehensive understanding of the perceptions of indigenous people in Perak towards fertigation technology while maintaining a rigorous and professional approach to data analysis.

3. RESULT AND DISCUSSION

3.1 Sociodemographic profile

Descriptive statistics were used to determine the sociodemographic characteristics of indigenous people in Perak. The demographic information includes gender, age, marital status, education level, geographical location, farm size, receipt of agricultural aid, type of aid received, knowledge about fertigation, use of fertigation, and obstacles in using fertigation technology. The socio-demographic profile of the sample (n=150) is presented in Table 1 respectively. Purposive sampling techniques may

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not provide a statistically representative sample of the total population of Indigenous people in Perak; however, it is valuable for this research objectives.

Table 1: Sociodemographic profile of the indigenous people in Perak, Malaysia

Variable (*n*, %)	Character	Sample (*n*=150)
Gender	Male	70 (46.7)
	Female	80 (53.3)
Age	20 years old – 39 years old	57 (38)
	40 years old – 59 years old	79 (52.7)
	60 years old – 79 years old	14 (9.3)
Marital status	Married	99 (66)
	Single	36 (24)
	Widow	15 (10)
Education level	Does not go to school	65 (43.3)
	UPSR	24 (16)
	Graduated from high school	45 (30)
	Technical certificated	7 (4.7)
	Diploma	9 (6)
Area	Batang Padang	111 (74)
	Kampar	19 (12.7)
	Muallim	20 (13.3)
Farm area	0.1 acre to 1.0 acre	126 (84)
	1.1 acre to 2.0 acre	23 (15.3)
	2.1 acre to 3.0 acre	1 (7)
Have use the fertigation	Yes	7 (4.7)
	No	142 (94.7)
Obstacle using fertigation technology	Financial	57 (38)
	Knowledge	59 (39.3)
	Facility	20 (13.3)
	Equipment	6 (4)
	Material	3 (2)
	Training	5 (3.3)

3.2 Level of Perception of Indigenous People Towards Fertigation Technology in Perak

Perception is defined as the ability of the human to recognise and evaluate sensory information (Levitas & William, 2021). Thus, understanding the level of perception of fertigation technology among Indigenous peoples is crucial for devising targeted interventions, building community support, and overcoming barriers to adoption. By addressing these perceptions effectively, adoption efforts can be more successful, leading to positive outcomes for both Indigenous communities and the broader agricultural sector.

Table 6 delineated the percentage, mean, and standard deviation for all seven measurement items of the construct "Perception towards Fertigation Technology" among indigenous people in Perak. Based on the table, almost 42% of the respondents disagree that "Fertigation technology can increase the quality and quantity of my plant crop" (Mean = 2.827, SD = .833). It is indicated that indigenous people did not think that the fertigation technology could improve the quality and quantity of their crops. This finding underscores a prevailing scepticism among indigenous individuals regarding the technology's potential to enhance crop quality and yield. Such scepticism can be attributed to the need for more concrete evidence or information on the benefits of fertigation technology (Rogers, 2003).

Additionally, the majority (37.7%) of the indigenous people disagree that "Fertigation technology can simplify the work of watering and manuring." (Mean = 2.820, SD = .997). This outcome strongly indicates that the indigenous population does not perceive fertigation technology as a means of simplifying essential agricultural tasks, such as watering and manuring. This perspective highlights the importance of addressing the perceived complexity or lack of clarity surrounding the technology's practical implementation.

The lowest contributed item to measure the level of perception among indigenous people in Perak is "Fertigation technology can improve my family's economic status" (Mean = 2.693, SD =0.919). Despite this, the majority of the indigenous people (36.7%) neither agree nor disagree that through fertigation technology can improve their family's economic status. This finding suggests a degree of uncertainty or lack of confidence among the indigenous population regarding the economic benefits of adopting the technology. This uncertainty may stem from a lack of firsthand experience or information on the technology's financial implications (Davis et al., 1989).

In summary, the results from this research underscore a prevailing sense of scepticism, particularly concerning the technology's potential to boost crop quality and simplify agricultural practices among indigenous people in Perak. Additionally, the uncertainty surrounding the technology's perceived impact on economic well-being warrants further attention and educational outreach. These findings emphasize the necessity of enhancing awareness and understanding of fertigation technology within this specific demographic. Table 2 details the measurement items for the perception of fertigation technology.

As shown in Table 2, 42% of the indigenous people in Perak have reported a moderate perception of fertigation technology. The overall value of 2.7667 (SD = .87774) manifested that most of the Indigenous people in Perak in this study have a moderate perception of fertigation technology regardless of their traditional agriculture activities. Previous studies, also agreed that indigenous people have a moderate perception of agriculture development (Hamid et al, 2013). As agreed by

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Junaidi and Yew (2018), the perception of indigenous people is negative for agriculture development programs.

In conclusion, the analysis reveals a prevailing lack of understanding and positive perception of fertigation technology among indigenous communities in Perak. Indigenous people do not perceive fertigation technology as a catalyst for improving their family's economic well-being or enhancing agricultural productivity and ease of farming practices. These findings underline the pressing need for educational initiatives aimed at reshaping the perception of indigenous communities in Perak, emphasizing the manifold benefits that fertigation technology can offer in the realm of agricultural activities.

Recent studies (Smith et al., 2021) have highlighted the pivotal role of targeted education and practical demonstrations in altering perceptions and fostering technology adoption among rural and indigenous communities. In line with this research, it is imperative to engage indigenous people in Perak through informative programs and hands-on experiences that elucidate the advantages of fertigation technology for their agricultural pursuits. This proactive approach can help bridge the knowledge gap, dispel misconceptions, and ultimately promote the uptake of this valuable agricultural innovation.

Table 2: Distribution of Indigenous People in Perak by Level of Perception of Fertigation Technology (n=150)

Level of Perception	Frequency	Percentage (%)
Low (1.00-2.339)	63	42.0
Moderate (2.4-3.669)	56	37.3
High (3.67-5)	31	20.7
Mean = 2.7667		
SD = 0.87774		

3.3 Level of Attitude of Indigenous People Towards Fertigation Technology in Perak

Attitudes reflect a person's actual control over behaviour or technology (LaMorte, 2019). If Indigenous people have positive attitudes toward fertigation technology, they are more likely to perceive it as beneficial and desirable for their agricultural practices. Conversely, negative attitudes may lead to scepticism or resistance toward the perception of fertigation technology. Understanding Indigenous people's attitudes towards fertigation technology crucial for understanding their perceptions, preferences, and concerns regarding adoption. It informs targeted interventions, communication strategies, and community engagement efforts aimed at promoting sustainable adoption and maximizing the benefits of fertigation technology for indigenous communities.

Table 7 delineated the percentage, mean, and standard deviation for all seven measurement items of the construct "Attitude towards Fertigation Technology" among indigenous people in Perak. Based on the table, almost 43.3% of the respondents disagree that "I am confident that by using fertigation technology it can save my time in managing the farm" (Mean = 2.673, SD = 1.052). It is indicated that the indigenous people feel not confident that the fertigation technology can save them time for time management. This finding underscores a prevalent lack of confidence among indigenous individuals in the technology's capacity to streamline their farm management processes, pointing to a significant hurdle in adopting this innovation. Recent studies in technology adoption have highlighted the role of confidence in influencing the attitude toward technology (Venkatesh et al., 2003).

Additionally, the majority (46.7%) of the indigenous people disagree that "I believe fertigation technology is easy and not complicated." (Mean = 2.667, SD = 1.001). This result notably highlights that the indigenous community perceives fertigation technology as intricate and challenging to implement in their farming practices. The perceived complexity of a technology can be a significant factor influencing its adoption and utilization (Venkatesh et al., 2003).

The finding of item "I enjoy using fertigation technology because it is very easy to manage" (Mean = 2.427, SD = 1.018) shows the lowest mean score. Despite this, the majority of the indigenous people (53.3%) disagree that they enjoy using fertigation technology. These findings indicated that the respondents did not feel that the fertigation technology is easy to manage that's why they do not enjoy using it.

The findings from this research underscore a prevalent lack of confidence, perceived complexity, and reduced enjoyment associated with the use of fertigation technology among indigenous people in Perak. These attitudes pose significant barriers to the technology's adoption. To address these issues, interventions should focus on building confidence, simplifying technology interfaces, and providing training and support to enhance the ease and appeal of using fertigation technology within the indigenous farming context. Table 5 detailed the measurement items for the perception of fertigation technology.

As shown in Table 3, 52% of the indigenous people in Perak are reported a moderate attitude toward fertigation technology. The overall value of 2.5875 (SD = .94309) manifested that almost all the indigenous people in Perak are predominantly unfavourable to fertigation technology. Supported by Singh & Sinha (2017), the level of farmers' attitudes toward the perception of irrigation systems is moderate. Previous study has found that Indigenous people in Perak have poor dependence attitude towards government assistant and program (Ali, 2008; Khir et al., 2021).

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This assessment has significant implications for understanding the readiness and receptiveness of indigenous communities in Perak towards adopting and incorporating fertigation technology into their agricultural practices. It is essential to recognize that attitude plays a pivotal role in technology adoption (Venkatesh et al., 2003). A low attitude towards the technology can act as a substantial barrier to its successful integration, necessitating targeted efforts to enhance the indigenous population's perception and willingness to engage with fertigation technology.

In this context, recent studies (Lee et al., 2020) have emphasized the importance of community engagement and tailored educational programs in influencing the attitude and acceptance of technological innovations among indigenous groups. These findings underscore the significance of fostering positive attitudes through community involvement and knowledge dissemination to promote the adoption of fertigation technology.

In conclusion, the results derived from this analysis illustrate a prevalent low attitude towards fertigation technology among indigenous people in Perak, suggesting the need for strategic interventions and educational initiatives. These endeavours can play a pivotal role in shifting attitudes, ultimately facilitating the successful integration of this technology into the indigenous agricultural landscape.

Table 3: Distribution of Indigenous People in Perak by Level of Attitude on Fertigation Technology (n=150)

Level of Attitude	Frequency	Percentage (%)
Low (1.00-2.339)	78	52.0
Moderate (2.4-3.669)	44	29.3
High (3.67-5)	28	18.7
Mean = 2.5875		
SD = .94309		

3.4 Level of Subjective Norm of Indigenous People Towards Fertigation Technology in Perak.

Subjective norms represent the perceived social pressure or expectations from significant others regarding a particular behavior (Ali et al., 2020). In the context of the perception of fertigation technology, subjective norms may include the influence of family members, peers, or community leaders. If indigenous individuals perceive that their community or social network expects them to adopt fertigation technology, they may be more inclined to do so. Understanding subjective norms helps researchers identify influential social factors that may facilitate or hinder the positive perception of fertigation technology among indigenous populations. Other studies have mentioned that subjective norm is a very important determinant of farmers' perception of the adoption technique of modern agriculture technologies (Daxini et al, 2018).

Table 8 delineated the percentage, mean and standard deviation for all seven measurement items of the construct "Subjective Norm towards Fertigation Technology" among indigenous people in Perak. Based on the table, more than 64% of the respondents disagree that "The fertigation technology facility provided by the government encouraged me to use it." (Mean = 2.430, SD = .944). It is indicated that indigenous people do not truly feel encouraged to use the fertigation technology provided by the government. Even the technology has been provided through initiative by the government, yet due to lack of education and awareness among the indigenous people that's become one of the reasons they could not change to better farm practices and advancement. Recent research (Smith & Johnson, 2021) has highlighted the need for targeted educational programs and awareness campaigns to bridge these gaps and facilitate technology adoption among indigenous communities.

Additionally, the majority (62.7%) of the indigenous people disagree that "The government's efforts to deal with the poverty among the indigenous people encouraged me to use fertigation technology in my farm." (Mean = 2.380, SD = .960). This finding significantly demonstrated that the efforts by the government did not yet reach the indigenous confidence in adopting the technology. A lot of efforts and effective implementation need to be made through extension activities in order the change their perception of fertigation technology. Government initiatives must be accompanied by effective extension activities that not only showcase the technology but also engage indigenous communities through hands-on demonstrations. The adage "seeing is believing" underscores the importance of experiential learning in fostering technology adoption (Lee et al., 2020). According to Yusuf et al. (2021), an agricultural extension is essential for helping farmers receive technological innovations. Additionally, it makes it possible for regional farmers' associations and groups to profit from these extension initiatives. Consequently, the study emphasises how important agricultural extension is in giving farmers the tools they need to improve their farming practises.

The lowest contributed item to measure level of perception among indigenous people in Perak is "Other farmers influenced me to use fertigation technology" (Mean = 2.240, SD = 0.994). Despite of this, the majority of the indigenous people (58.0%) have disagreed that their friends in farm could influenced them using the fertigation technology. It shows that none of them are successfully yet using the fertigation and producing yield through an advanced technology. They don't receive any social pressure to motivate them in using the new technology. Therefore, extensionist need to educate their leader among

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indigenous people to motivate and change their people's view.

The research findings reveal that there are three major obstacles to the adoption of fertigation technology by indigenous people in Perak. These include a lack of motivation, insufficient government efforts, and a lack of social influence. To address these challenges, tailored educational programs, government initiatives, and community engagement strategies are needed to shift perceptions and promote the use of technology in indigenous farming practices. Table 6 detailed the measurement items for the perception of fertigation technology.

As shown in Table 4, 74% of the indigenous people in Perak are reported low subjective norm on fertigation technology. The overall value of 2.3343 (SD = .90242) underscores the pervasive lack of motivation and social pressure to embrace this technology within the indigenous community in Perak. Previous studies found that there are different findings with the level of subjective norm towards any agricultural technology was moderate because of their large network using the same technology (Castillo et al, 2021). While Nurul and Siti (2021), found that the level of subjective norm toward the perception to adopt modern technologies in farming is high.

The assessment has significant implications for comprehending the motives and social dynamics that govern the adoption of fertigation technology. Recent studies (Brown & Venkatesh, 2021) emphasize the importance of social influence and peer pressure in shaping the acceptance and diffusion of technology. The lack of subjective norms among indigenous people highlights the significance of creating a supportive and encouraging community environment to promote the adoption of technology.

Furthermore, the results indicate that indigenous individuals in Perak exhibit a marked dearth of motivation and social pressure when it comes to adopting fertigation technology. This shortfall in motivation and social reinforcement may serve as a substantial impediment to technology adoption, calling for targeted interventions and awareness-building efforts within the community. Successful technology adoption in rural and indigenous settings often hinges on fostering a sense of collective enthusiasm and support (Gupta & Suman, 2021).

In conclusion, the results highlight the lack of motivation and social pressure among indigenous people in Perak when it comes to adopting fertigation technology. This emphasizes the need for collective efforts to create a supportive and encouraging community environment that can promote technology acceptance. By addressing these barriers, we can help integrate fertigation technology successfully into traditional agricultural practices in indigenous communities.

Table 4: Distribution of Indigenous People in Perak by Level of Subjective Norm on Fertigation Technology (n=150)

Level of Subjective Norm	Frequency	Percentage (%)
Low (1.00-2.339)	111	74
Moderate (2.4-3.669)	16	10.7
High (3.67-5)	23	15.3
Mean = 2.3343		
SD = .90242		

3.5 Level of Perceived Behavioral Control of Indigenous People Towards Fertigation Technology in Perak.

Perceived behavioural control of an individual is derived from the capabilities, resources, and opportunities have (Zhang, 2018). In the previous studies by Ali et.al (2020), perceived behavioural motivation is the main factor that influences the farmers on their usage of the fertigation systems. The level of perceived behavioral control among indigenous communities is crucial for understanding the barriers, resources, and cultural factors that fertigation technology perception. By tailoring interventions to address these perceptions effectively, policymakers and organizations can support indigenous communities in adopting sustainable agricultural practices that improve livelihoods, enhance food security, and promote environmental stewardship.

Identifying perceived barriers and facilitators to adopting fertigation technology among indigenous communities can inform interventions aimed at improving access to resources, providing training and support, and addressing concerns about technical feasibility. Table 9 delineated the percentage, mean, and standard deviation for all seven measurement items of the construct "Perceived Behavioural Control towards Fertigation Technology" among indigenous people in Perak. Based on the table, almost 58% of the respondents disagree that "It is easy for me to get information about fertigation technology." (Mean = 2.480, SD = .981). It is indicated that this statistic underscores the presence of a significant hurdle in accessing information on fertigation technology, a factor that is pivotal in the decision-making process regarding its adoption. The perceived difficulty in accessing information about agricultural innovations like fertigation technology is a significant barrier in previous research (Rogers, 2003).

Additionally, majority (64%) of the indigenous people disagree that "I am clear on how to handle fertigation technology." (Mean = 2.407, SD = .949). These findings significantly demonstrated the lack of clarity and understanding among the indigenous population concerning the practical aspects of utilizing fertigation technology. This lack of clarity might be attributed to a deficit in educational resources or inadequate training

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opportunities, which have been shown to affect technology adoption in agricultural contexts (Davis et al., 1989).

The lowest contributed item to measure level of perception among indigenous people in Perak is

"A have a lot of information on fertigation technology can make us farmers trust the system more" (Mean = 2.340, SD = 0.881). Despite of this, the majority of the indigenous people (65.3%) have disagreed that through fertigation technology can improve their family's economic status. This outcome suggests a disconnect between the perception of information availability and its perceived impact on economic well-being. This contradictory finding highlights the complex interplay of factors influencing the indigenous community's perception of fertigation technology and its potential benefits.

From this research, the results highlight several key challenges in the perceived behavioural control of indigenous people in Perak regarding the adoption of fertigation technology. The findings emphasize the need for improved access to information, enhanced clarity on technology handling, and addressing the apparent disparity between information availability and economic expectations. This understanding can inform targeted interventions and policy initiatives aimed at fostering the successful integration of fertigation technology within indigenous agricultural practices. Table 8 details the measurement items for the perception of fertigation technology.

As shown in Table 5, 72% of 150 Indigenous people in Perak in the current study reported low perceived behavioural control on fertigation technology due to the majority (n=108) of respondents strongly disagree and disagree with the statement that mentions perceived behavioural control affects their perception toward fertigation technology. The overall value of 2.3933 (SD = .86919) manifested that almost all the indigenous people in Perak have a low perceived behavioural control of fertigation technology regardless of their traditional agriculture activities. Supported by Daxini et al. (2018), the perceived behavioural control has low level of perception to use the agriculture technologies plan. Contradict with past study has showed that the level perceived behavioural control towards perception of agriculture technology is moderate due to their previous experience on handling less complex agriculture technology (Castillo et al, 2021). Supported by Nurul and Siti (2021), showed that the level of perceived control toward perception to use modern and more complex agriculture technology is moderate.

To sum up, the analysis results shown that the indigenous people in Perak are pretty low in their belief towards fertigation technology. This finding holds significant implications for understanding the prevailing attitudes and barriers surrounding the uptake of fertigation

technology within the indigenous community in Perak. The substantial proportion of respondents reporting low perceived behavioral control indicates a notable hesitancy or lack of confidence in adopting this agricultural innovation. This insight aligns with existing research that emphasizes the importance of addressing perceived behavioral control as a critical determinant in the acceptance and implementation of new technologies (Ajzen, 1991).

To elaborate further on the implications of these results, it is worth noting that perceived behavioral control is one of the key components of the Theory of Planned Behavior (Ajzen, 1991). This theory posits that individuals are more likely to engage in a behaviour when they perceive it to be under their control. Therefore, the widespread low perceived behavioural control among indigenous people in Perak may act as a significant impediment to the successful integration of fertigation technology into their traditional agricultural practices (Ajzen, 1991; Fishbein & Ajzen, 2010).

Furthermore, this finding aligns with previous research conducted in similar contexts. For example, studies examining technology adoption among indigenous communities have highlighted the importance of cultural factors and community-specific beliefs in shaping technology acceptance (Smith, 2005). In conclusion, this analysis provides robust evidence that the indigenous population in Perak demonstrates a notably low level of confidence and perceived behavioural control when it comes to the incorporation of fertigation technology into their traditional agricultural practices. This underscores the need for targeted interventions, culturally sensitive educational programs, and policy initiatives aimed at improving the acceptability and successful adoption of agricultural innovations within indigenous communities in Perak.

Table 5: Distribution of Indigenous People in Perak by Level of Perceived Behavioural Control on Fertigation Technology (n=150)

Level of Perceived Behavioural Control	Frequency	Percentage (%)
Low (1.00-2.339)	108	72.0
Moderate (2.4-3.669)	18	12.0
High (3.67-5)	24	16.0

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Mean = 2.3933

SD = .86919

Table 6: Distribution of Indigenous People in Perak by Perception of Fertigation Technology (n=150)

Statement	Percentage (%)					Mean	SD
	1	**2**	**3**	**4**	**5**		
1. Fertigation technology can increase the quality and quantity of my plant crop.	0	42	36	19	2	2.827	0.833
2. Fertigation technology can simplify the work of watering and manuring.	6.0	37.3	30.0	22.0	4.7	2.820	0.997
3. Fertigation technology can minimise the risk of the roots contracting soil-borne diseases	4.7	37.3	36.0	18.7	3.3	2.787	0.916
4. Fertigation technology is easy to use and uncomplicated	6.0	38.0	33.3	18.7	4	2.767	0.958
5. Fertigation technology can save time and money	8.7	35.3	29.3	25.3	1.3	2.753	0.976
6. Fertigation technology can increase the absorption of nutrients by my plant crops	5.3	40.7	33.3	18.0	2.7	2.720	0.913
7. Fertigation technology can improve my family's economic status	8	36.0	36.7	17.3	2	2.693	0.919
Overall						2.7667	.87774

Note. 1 = Strongly Disagree, 2 = Disagree, 3 = neither agree nor disagree, 4 = Agree, 5 = Strongly Agree.
SD = Standard Deviation.

Table 7: Distribution of Indigenous People in Perak by Attitude towards Fertigation Technology (n=150)

Statement	**Percentage (%)**					**Mean**	**SD**
	1	**2**	**3**	**4**	**5**		
1.I am confident that by using fertigation technology it can save my time in managing the farm	10.0	43.3	19.3	24.0	3.3	2.673	1.052
2. I believe fertigation technology is easy and not complicated	7.3	46.7	21.3	21.3	3.3	2.667	1.001
3. I am confident that my income can increase by using fertigation technology	8.7	46.7	20.7	21.3	2.7	2.630	1.000
4. I am aware of the existence of this technology	12.0	48.7	10.0	26.0	3.3	2.600	1.099
5. I am convinced that by using fertigation technology the quality of my crops can be improved compared to using conventional methods	14.0	42.7	21.3	20.0	2.0	2.533	1.027
6. I am interested in using fertigation technology on my farm	13.3	53.3	8.0	21.3	4.0	2.493	1.091
7. I enjoy using fertigation technology because it is very easy to manage.	13.3	53.3	14.0	16.0	3.3	2.427	1.018
Overall						2.5875	.94309

Note. 1 = Strongly Disagree, 2 = Disagree, 3 = neither agree nor disagree, 4 = Agree, 5 = Strongly Agree.
SD = Standard Deviation.

Table 8: Distribution of Indigenous People in Perak by Subjective Norm towards Fertigation Technology (n=150)

Statement	**Percentage (%)**					**Mean**	**SD**
	1	**2**	**3**	**4**	**5**		

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1. The fertigation technology facility provided by the government encouraged me to use it.	7.3	64.0	10.7	14.7	3.3	2.430	0.944
2. The government's efforts to deal with the poverty among the indigenous people encouraged me to use fertigation technology in my farm.	10.0	62.7	10.0	14.0	3.3	2.380	0.960
3. The Department of Agriculture always ensures that I use fertigation technology to improve the quality of my agriculture.	9.3	67.3	5.3	14.7	3.3	2.353	0.956
4. JAKOA always encouraged me to use fertigation technology.	8.7	69.3	5.3	14.7	2.0	2.320	0.900
5. The fertigation technology aid received from the government makes it easier to use fertigation technology	11.3	66.7	6.0	11.3	4.7	2.313	0.977
6. My family members encouraged me to use fertigation technology	16.0	57.3	10.0	13.3	3.3	2.310	1.003
7.Other farmers influenced me to use fertigation technology	18.7	58.0	6.0	15.3	2.0	2.240	0.994
Overall						2.3343	.902

Note. 1 = Strongly Disagree, 2 = Disagree, 3 = neither agree nor disagree, 4 = Agree, 5 = Strongly Agree.
SD = Standard Deviation.

Table 9: Distribution of Indigenous People in Perak by Perceived Behavioural Control towards Fertigation Technology (n=150)

Statement	**Percentage (%)**					**Mean**	**SD**
	1	**2**	**3**	**4**	**5**		
1. It is easy for me to get information about fertigation technology.	8.7	58.0	13.3	16.7	3.3	2.480	0.981
2. I am clear on how to handle fertigation technology	8.0	64.0	11.3	12.7	4.0	2.407	0.949
3. I am knowledgeable about fertigation technology	5.3	7	9.3	14.7	2.0	2.393	0.874
4. It is easy for me to practice fertigation technology.	6.7	67.3	10.0	12.7	3.3	2.387	0.910
5. It is easy for me to get fertigation technology training at my place.	8.0	64.7	10.7	14.0	2.7	2.387	0.918
6. I easily get the help of fertigation technology on my farm	7.3	67.3	10.7	11.3	3.3	2.360	0.900
7. I have a lot of information on fertigation technology can make us farmers trust the system more	8.7	65.3	11.3	12.7	2.0	2.340	0.881
Overall						2.3933	.869

Note. 1 = Strongly Disagree, 2 = Disagree, 3 = neither agree nor disagree, 4 = Agree, 5 = Strongly Agree.
SD = Standard Deviation.

4. CONCLUSION

This article presents the results of a study on the levels of attitude, subjective norm, perceived behavioural control, and perception towards fertigation technology among indigenous people in Perak. The findings indicate that Indigenous people in Perak have a moderate perception of fertigation technology followed by attitude, while subjective norm and perceived behavioural control have a low mean score. Indigenous people have a moderate perception of fertigation technology due to difficulties in transcultural communication and hesitancy regarding technological advancements.

The research suggests that non-profit organizations such as JAKOA and DOA should increase the number of agriculture-related educational programs for indigenous people. These programs should focus on new technologies and practices related to agriculture, as this industry is crucial for the socio-economic development of indigenous communities. Besides, agricultural education programs for Indigenous peoples should be co-designed and co-implemented in partnership with Indigenous communities, respecting

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Indigenous knowledge systems, values, and governance structure because Indigenous communities often have deeply rooted cultural beliefs and practices (Cai, 2020). The introduction of new technologies may be perceived as a threat to their cultural identity or way of life. Additionally, traditional practices may be valued over adopting unfamiliar technological advancements. To further improve the study, the KAP (Knowledge, Attitude, and Practice) theory could be applied. This will help to better understand the indigenous people's involvement in the industry and how they can benefit from new technologies.

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