Research on World Agricultural Economy
https://journals.nasspublishing.com/index.php/rwae

ARTICLE

Consumers' Awareness, Perception and Willingness-to-Pay for MyGAP-Compliant Farmed Fish Produce: Evidence from Malaysia

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ABSTRACT

Aquaculture is essential for the global fish supply, but sustainable practices in Malaysia face significant challenges. MyGAP certification promotes safety and sustainability; however, its adoption is hindered by high costs, technical barriers, and limited consumer awareness, which hampers efforts to advance sustainable aquaculture practices. The main objective of this paper is to investigate consumers' awareness, perceptions, and willingness to pay (WTP) for MyGAP-compliant farmed fish in a Malaysian context. A contingent valuation approach was employed to assess consumers' WTP, while a binomial logit model was used to determine factors influencing this willingness. Findings reveal that awareness variables, including aquaculture knowledge, green consumer behavior, and MyGAP awareness, significantly influence WTP for MyGAP-compliant farmed fish. Over 73% of consumers expressed a willingness to pay a premium, reflecting favorable perceptions of MyGAP-compliant fish and a growing preference for high-quality, safe, and sustainable food. A labeling system to distinguish MyGAP-compliant products is crucial for justifying price differences and covering producers' additional costs, such as pond renovations and adherence to quality input standards outlined in MyGAP guidelines. Public education on sustainable aquaculture, coupled with

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ARTICLE INFO
Received: 21 May 2025 | Revised: 17 June 2025 | Accepted: 24 June 2025 | Published Online: 11 August 2025
DOI: https://doi.org/10.36956/rwae.v6i3.2192

CITATION
Kamaruddin, R., Soon, J.J., Samah, R., et al., 2025. Consumers' Awareness, Perception and Willingness-to-Pay for MyGAP-Compliant Farmed Fish Produce: Evidence from Malaysia. Research on World Agricultural Economy. 6(3): 875–890. DOI: https://doi.org/10.30564/rwae.v6i3.2192

fair pricing strategies, effective MyGAP enforcement, and increased consumer awareness, can further encourage sustainable practices.

Keywords: Consumers' Awareness; Consumers' Perception; Willingness-to-Pay; MyGAP-Compliant Farmed Fish; Sustainable Aquaculture

1. Introduction

Aquaculture is a primary source of fish for global consumption, increasingly significant to consumers and policymakers. The United Nations' Food and Agriculture Organization (FAO) introduced the Code of Conduct for Responsible Fisheries and Aquaculture to promote sustainable development in aquaculture. This global guideline outlines appropriate practices that are adaptable to individual aquaculturists or aquaculture associations [1]. The Code's general principles are detailed in the Code of Practice, which includes Best Management Practices (BMPs), also known as Good Management Practices (GMP) or Good Aquaculture Practice (GAqP).

Private certifications and standards are central to the global fish trade [2], driven by major buyers, especially in developed countries, who prioritize certified food products [3]. These certifications ensure sustainable, high-quality production, addressing consumer demands for environmentally responsible practices and advancing sustainability in aquaculture. In line with the FAO's Code of Conduct for Responsible Fisheries, Malaysia's Department of Fisheries (DOF) introduced GAqP in 2004, issuing Malaysian Aquaculture Farm Certificates to farmers adhering to these guidelines. The program aims to ensure the production of safe, high-quality aquaculture products that are sustainably produced and comply with animal welfare, environmental, and occupational safety standards. In 2013, this certification was rebranded as Malaysian Good Agricultural Practice (MyGAP) for aquaculture [4]. Participation in MyGAP certification programs offers multiple benefits [5]. Certified products meet international and domestic food safety requirements, facilitating the faster issuance of Health and Sanitary Certificates, and enhancing consumer awareness and acceptance. This supports local farms and the aquaculture industry in achieving environmental sustainability while boosting competitiveness in global markets.

Aquaculture farmers will reap benefits from the introduction and eventual implementation of MyGAP. In reality, however, implementing MyGAP, especially in freshwater systems, faces hurdles from the start [?]. Aquaculture farmers, particularly small-scale ones, are not adopting MyGAP practices as quickly as expected. This is possibly due to high trade-offs in terms of time investment, large capital costs, relatively narrow markets for the products, and steep learning curves of technical know-how [1]. Without a tangible support infrastructure and ecosystems, these aspects will discourage even the best-intentioned aquaculture farmers from adopting MyGAP [9]. From a market perspective, the absence of price differentiation between MyGAP-compliant and non-compliant farmed fish signals a lack of product premium. As a result, producers adhering to MyGAP standards face low profit margins due to substantial capital investments that cannot be recovered without premium pricing [10, 11]. Introducing price premiums for certified products is therefore considered a strategic approach to incentivize greater adoption of MyGAP practices among aquaculture farmers [12, 13]. Importantly, the feasibility of premium pricing depends on consumers' willingness to pay (WTP) for the attributes associated with certified products. In this regard, consumers play a pivotal role in shaping the market for MyGAP-compliant products, as their purchasing decisions ultimately determine the economic viability of certification [11, 14].

However, many consumers are unable to distinguish between MyGAP-compliant and non-compliant farmed fish, particularly when price differences are absent. In this context, three interconnected constructs—consumer awareness, perception, and WTP—are critical to understanding market responses to certification labels [15, 16]. Consumer awareness refers to the degree to which individuals recognize and comprehend the MyGAP label and its significance. This includes familiarity

with the certification logo, an understanding of its core attributes, such as food safety, environmental sustainability, and ethical production, and the ability to differentiate between certified and non-certified products [17, 18]. Awareness constitutes the foundational cognitive stage of consumer decision-making and influences whether certification labels are considered during the purchase process [19, 20].

Building upon awareness, consumer perception refers to how individuals interpret, evaluate, and emotionally respond to a certified product [15, 16]. This includes their beliefs regarding the trustworthiness, credibility, and value-added benefits associated with the MyGAP label [13, 17, 21]. Perception is shaped by both cognitive factors, such as prior knowledge, risk assessment, and product familiarity, as well as affective factors, including institutional trust and alignment with personal or ethical values [15, 18]. Positive perceptions enhance the perceived utility of certified products, increasing the likelihood that consumers view MyGAP-certified fish as safer, healthier, or more socially and environmentally responsible [13]. Empirical studies suggest that credibility and transparency in certification schemes are crucial for building consumer confidence, particularly in markets where eco-label fatigue and greenwashing are concerns [11, 21].

The culmination of awareness and perception is reflected in consumers' WTP, defined as the maximum price that a consumer is willing to pay for a product or service [22]. This is particularly valuable as it provides deeper insight into individual preferences and perceived value [23]. In this study, WTP serves as an economic indicator of the utility consumers attach to MyGAP-compliant farmed fish relative to non-compliant options. WTP is commonly assessed using stated preference methods, such as the contingent valuation method (CVM) and choice experiments, which provide empirical insights into demand for credence attributes, including sustainability, food safety, traceability, and ethical farming practices [20, 24, 25]. Recent literature highlights that WTP is not only influenced by product attributes but also by consumer awareness campaigns, socio-demographic factors, and the visibility of certification in retail environments [26].

Despite the conceptual importance of awareness, perception, and WTP in shaping sustainable consumption, there remains a notable gap in empirical research that explores these dimensions from the consumer's perspective, particularly within the aquaculture sector. Most existing studies have prioritized supply-side concerns, with a strong focus on issues such as producer compliance with MyGAP standards [27, 28], technical implementation challenges [29], and farm-level impacts [30]. Only a limited number of studies have investigated consumer behavior in this domain. For instance, Sundram and Matthew [31] examined consumers' willingness to pay for MyGAP-certified vegetables in Klang Valley, reporting moderate awareness and a modest WTP premium ranging from RM1.58 to RM6.33. Similarly, Kamaruddin et al. [32] explored consumer preferences for farmed fish and their WTP for GAqP-compliant products. Nasir et al. [33] studied urban consumers' willingness to pay for fish labeled as "antibiotic-free". In a related study, Goh et al. [34] examined perception gaps between farmed and wild fish, revealing a consumer bias toward wild fish despite a lack of scientific evidence supporting their perceived superiority. These findings highlight the potential role of certification labels in addressing consumer misperceptions and promoting sustainable aquaculture, yet this area remains underexplored in the Malaysian context.

Certification labels such as MyGAP function as market signals intended to convey credence attributes, including qualities like food safety, environmental sustainability, and ethical production, which are not directly observable even after consumption. Such attributes require credible third-party certification to build consumer trust [35]. However, the effectiveness of certification labels hinges on consumer awareness. Without knowledge of the label, its significance, or the certifying institution, the signal fails to function effectively. Awareness is therefore the initial cognitive step in the consumer decision-making process, allowing the certification to enter the consumer's consideration set, after which it may shape perception and influence behavior [17].

2. Theoretical Framework

This study is underpinned by the utility maximization theory, which posits that consumers act as rational decision-makers who seek to maximize their satisfaction (utility) within the limits of their income and budget constraints [36, 37]. Classical consumer theory assumes that utility is derived from observable and intrinsic product attributes, such as taste, quality, and nutritional value [36, 38]. However, in the context of certified food products, this framework has been extended to account for credence attributes, such as food safety, environmental sustainability, and ethical standards, that consumers cannot directly verify and must instead infer through trusted certification systems, like MyGAP [35, 39]. These extensions reflect the growing importance of information asymmetry and institutional trust in shaping consumer utility and purchasing behavior in modern food systems [10, 40, 41].

Within this framework, awareness of the MyGAP certification becomes a prerequisite for utility formation. Without such awareness, consumers cannot incorporate the certification into their utility function, rendering it ineffective as a decision-making cue. Empirical studies have shown that product knowledge and label familiarity significantly influence the utility consumers derive from certified goods [18]. For instance, a consumer who is unaware of MyGAP's significance cannot rationally assign utility to it, regardless of the actual product benefits. Once consumers are aware of a certification, their perception plays an important role in influencing their satisfaction or utility [15]. This perception is shaped by how much they trust the certifying body, their beliefs about the label's promises of safety or sustainability, and whether it aligns with their personal values [10, 16, 17]. Even if the product itself does not differ physically, these perceived benefits can increase its value to the consumer. This supports findings that consumers often feel good about choosing products with ethical or sustainable labels [15, 41].

However, utility theory alone does not fully explain consumer behavior, as it often overlooks psychological, social, and contextual influences that shape decision-making [16, 17]. Recent studies emphasize the role of trust, emotions, habits, and social norms [18, 41]. Broader frameworks now include factors such as health concerns, risk perception, and label trust to predict WTP better [24]. Similarly, subjective knowledge and perceived behavioral control have been found to influence certified food choices [42, 43].

Additionally, socio-economic factors such as income, education, and household structure play a critical role in determining whether perceived utility translates into actual WTP. For example, Zhang et al. [41] found that higher-income and better-educated consumers were more likely to pay a premium for certified products. In contrast, lower-income consumers, despite recognizing the value of certification, were less able to justify the additional cost. A similar pattern emerged in a study conducted in Mashhad [44], where food label comprehension and perceived relevance were significantly influenced by educational level and urban residency. Comparable results were observed by de-Magistris and Gracia [26] and Interis and Haab [45], where income and education were found to be significant predictors of consumer preferences for traceable and certified food. In Southeast Asia, studies by Kamaruddin et al. [32] and Nasir et al. [33] also indicated that affordability and awareness are key barriers among lower-income urban consumers. Collectively, these findings underscore the need for context-sensitive and behaviorally informed utility models.

This study makes a meaningful contribution to the literature by addressing several critical gaps. While previous research has explored consumer preferences for certified products, it often treats utility as static and purely economically rational. In contrast, this study adopts a more dynamic and nuanced perspective, incorporating awareness, perception, and socio-economic factors as key antecedents to WTP. By embedding consumer decision-making within a broader framework of behavioral economics, the study accounts for how real-world complexities influence value perception and purchasing behavior. In doing so, this research not only advances theoretical understanding by refining the traditional utility maximization model but also offers practical implications for policymakers and industry stakeholders. Specifically, it provides evidence-based insights to support the design and promotion of sustainable and ethical consumption strategies through certification pro-

grams, such as MyGAP.

3. Materials and Methods

3.1. Data Collection

This study uses data collected through an online survey of Malaysian consumers to acquire information on the willingness of consumers to pay for MyGAP-compliant farmed fish. The survey was conducted between May and July 2022, covering all states in Malaysia using a non-probability sampling design. The study focused on Malaysian working adults aged 18 years and above who consume fish, as this group is presumed to have decision-making authority to influence household food purchases, particularly for fish products. The inclusion of individuals aged 18 and above aligns with Malaysia's legal voting age, which signifies the ability to make independent decisions. Our designated age range is similar to that of Interis and Haab [45]. Based on data from the Department of Statistics Malaysia [46], the estimated adult population in this age group is approximately 21.88 million.

To identify an appropriate sample size, we consulted the Krejcie and Morgan [47] sampling table, which recommends a minimum of 384 respondents for any population exceeding one million, assuming a 95% confidence level and 5% margin of error. However, as the data collection was carried out via an online survey, we opted to distribute the questionnaire to 800 individuals, more than twice the required minimum. This adjustment was made to account for the likelihood that not all respondents would be fish consumers, which is central to the study's focus. A screening question, "Do you consume fish?", was placed at the beginning of the survey to ensure that only eligible participants—those who eat fish—were included in the analysis. This precondition effectively excluded non-consumers and ensured that the findings accurately reflected the perspectives of actual fish consumers. Of the 800 questionnaires distributed, 645 were returned with complete responses, resulting in a response rate of 81%, which is considered commendable for online surveys. This final sample size exceeds the threshold required for statistical reliability, allowing for generalization to the broader adult fish-consuming population in Malaysia.

To enhance the credibility and clarity of the instrument, the questionnaire was reviewed in collaboration with officers from the Department of Fisheries Malaysia and further refined through focus group discussions involving consumers from diverse backgrounds. Additionally, a pilot test was conducted to assess the questionnaire's clarity, ease of understanding, and average completion time, which was found to be around 15 minutes.

There are 5 sections to the questionnaire: (i) sociodemographic information, (ii) knowledge on aquaculture, (iii) behavior toward farmed fish, (iv) awareness on MyGAP, and (v) WTP for MyGAP-compliant produce. For the benefit of respondents who may have difficulty differentiating between fish species, we have enhanced the questionnaire with pictorial information and infographics.

3.2. Analysis of Consumers' WTP for MyGAP-Compliant Farmed Fish

To understand consumers' preferences for farmed fish and how willing they are to pay for MyGAP-compliant farmed fish, we apply the CVM, which is an established method in the literature of consumer preference and WTP. Compared to choice experiments (CE), which are superior in analysing preferences while controlling for ethical aspects, CVM is more popular in analysing preferences, particularly those of public goods. Nevertheless, CVM has found applications in the analysis of preferences of private goods, such as those in GMO-free food [48] and renewable energy [49].

A slight drawback of CVM is its tendency to produce upwardly biased results when compared to those of CE; this is likely because CVM does not model the market realistically enough. In WTP analyses, the hypothetical bias of CVM, however, tends to be lower for private goods [49, 50]. In the CVM approach, one asks directly for respondents' WTP, implying that product values are given more emphasis. Non-response rates for CVM tend to be higher than those for CE, indicating that budgetary constraints are important considerations [51]. All that being said, valid and reliable CVM results depend on the CVM design, for example, how items on WTP are asked, if the items are intuitively comprehensible, and whether

the WTP scenarios closely mimic the real world [50].

In this study, the CVM involves the creation of an online hypothetical market. To ensure respondents are aware of MyGAP-compliant farmed fish before eliciting their WTP, we provide information on MyGAP fish and support it with an infographic about the differences between ordinary farm fish and MyGAP-compliant farmed fish. Respondents are also reminded of the importance and the impact of their WTP for MyGAP fish. In our case, we expect most of the consumers to be unfamiliar with MyGAP fish, and that they would find it difficult to express their WTP for MyGAP fish. Therefore, the CVM dichotomous choice seems to be the best technique. CVM analysis is performed by creating a survey for a hypothetical market scenario in which respondents answer "Yes" or "No" to a specific WTP amount. Since MyGAP farmed fish practices are still in their early stages in Malaysia, CVM enables individuals to assign values to hypothetical situations; thus, CVM is most appropriate in situations where consumers have limited information about the real market.

To describe our dataset, we use summary statistics, such as means and percentages. We present cross-tabulations on MyGAP awareness, green consumer behaviour, and perception of MyGAP-compliant farmed fish. A binary logistic regression model as in Equation 1 is used to obtain estimates on how consumer characteristics, product attributes, and market environment affect consumers' WTP for MyGAP-compliant farmed fish. Below is the WTP linear regression model.

$$WTP_i = \alpha + \beta X_i + \varepsilon_i \tag{1}$$

Where, WTP_i is the consumer's WTP for MyGAP-compliant farmed fish of respondent i with the value "Yes"=1 or "No"=0, α is the constant term, X_i is a vector of explanatory variables that affect consumers' WTP for MyGAP-compliant farmed fish, such as product characteristics, consumer characteristics and the market environment (economic and physical), β is the parameter vector associated with X_i, ε is the error term and i= the ith respondent. To identify the determinants of consumers' decisions to pay extra for MyGAP-compliant aquaculture produce, we apply a binary logit analysis. Here, we document the independent variables of our logit model (Equation 2); they are obtained from our questionnaire survey.

- Bid prices are divided into 5 levels, starting with RM8/kg (the current market price), followed by RM10/kg, RM11/kg, RM13/kg, and RM15/kg. From these price levels, RM11/kg represents an incremental price, calculated by considering the a 30% cost increase for MyGAP implementation. The remaining bid price levels are obtained through our focus group discussions.
- Socio-demographic variables, such as age in years, education level based on qualification obtained, household size, and total household income.
- MyGAP awareness includes aquaculture knowledge and green consumer behaviour dimensions. Each dimension is represented by indicators, as presented in section 3.2, estimated using the principal component analysis technique.
- Perception of MyGAP-compliant farmed fish quality, which is also indicated by several indicators as presented in section 3.3., and is computed using principal component analysis.

Below is the full estimation model:

$$\begin{gathered} WTP_i = \alpha + \beta_1 AGE + \beta_2 FAMILY \\ +\beta_3 EDU + \beta_4 INCOME + \beta_5 EATEN \\ +\beta_6 BID + \beta_7 KNOWLEDGE \\ +\beta_8 GREEN + \beta_9 AWARENESS \\ +\beta_{10} PERCEPTION \end{gathered} \tag{2}$$

with WTP_i as dependent variable (i.e. respondents' WTP for the proposed bid amount); age (AGE); family size ($FAMILY$); education level (EDU); total household income ($INCOME$); other variables related to the respondent: number of farmed fish species consumed ($EATEN$); bid price (BID); consumers' knowledge on aquaculture ($KNOWLEDGE$); green consumer behaviour ($GREEN$); consumers' awareness on MyGAP ($AWARENESS$) and consumers' perception on MyGAP-compliant farmed fish ($PERCEPTION$).

4. Results

4.1. Sociodemographic Variables

Respondents were categorized by age, education,

household size, and income. **Table 1** presents the summary statistics. The largest age group was 40–49 years (33.2%), while older respondents (60 years and above) comprised only 4.7%, likely due to limited access to online surveys. Education-wise, more than 55% of the respondents hold a bachelor's degree or higher, 23.7% possess post-secondary qualifications, and 11.8% have high-school qualifications. We expect most of our respondents to be IT-literate and well-educated, as our study is conducted using questionnaires distributed through various social media platforms.

Table 1 also reports the respondents' income categories, as they are a key explanatory variable of consumers' purchasing behaviour. We follow the Malaysian household income categorization, i.e., the B40 households (those at the bottom 40% of income distribution), M40 (the middle 40%), and T20 (the top 20%). The Department of Statistics Malaysia defines B40 households as those with a monthly income of less than RM4,850, and T20 as those with a monthly income of more than RM10,960. Most of the respondents here come from B40 households, i.e., almost 60% of them. The average monthly household income, however, stands at RM5,166, which is lower than the 2019 national average of RM7,901 [52].

Table 1. Sociodemographic characteristics.

Sociodemographic Variables	Percentage (%)	Mean	SD
Age		48	1.091
20-29	13.0		
40-49	33.2		
50-59	27.8		
60 and above	4.7		
Household Size		5	1.641
1-2	10.3		
3-4	31.8		
5-6	40.5		
7 and above	17.5		
Education level		Not applicable	Not applicable
No formal school	6.4		
Primary school	0.2		
Lower Secondary school	1.2		
Higher Secondary School	11.8		
HCS/STPM/STAM/A Level/Certificate/Diploma	23.7		
Bachelor Degree	24.8		
Master Degree	26.7		
PhD	5.3		
Household Income level		5166.42	5241.26
B40 (≤RM4849)	59.1		
M40 (RM4,850 to RM10.959)	33		
T20 (≥RM10,960)	8		

4.2. Awareness on MyGAP

In this research, the consumer's awareness of MyGAP is measured in terms of their knowledge of aquaculture activities, awareness of MyGAP (Aquaculture) certification, and green consumerism behaviour. In terms of knowledge, the majority (66.9%) of consumers are aware of aquaculture activities. Of these, however, only 44.2% of consumers know the difference between farmed fish and wild-caught fish. **Table 2** shows that consumers' awareness of MyGAP is low, with the majority of consumers (68.5%) being unaware of MyGAP. Only 39.7% and 15.8% of consumers have seen the MyGAP logo and know its meaning, respectively.

Green consumerism is defined as the demand by consumers for products and services that have been produced in an environmentally friendly manner, or in ways that are protective of natural resources. Green

food refers to nutrient-dense, high-quality foods that are safe to eat, healthy, do not contain excessive amounts of chemicals, and are grown or produced by high standards of sustainable animal welfare [31]. The term "green" has been largely replaced by terms such as "eco-friendly," "ecological," or "environmentally responsible," which describe human activities that are beneficial to the environment [53].

Table 2. Awareness on MyGAP among consumers.

Indicator	Consumers' Awareness (dummy, yes = 1,no = 0)		Mean Score	Standard Deviation	Cronbach Alpha
	1	0			
Knowledge					
Do you know any aquaculture activities?	83.1	16.9	0.83	0.370	0.699
Have you seen any fish culture activities?	70.4	29.6	0.70	0.457	
Do you know how to differentiate between farmed fish and captured fish?	44.2	55.8	0.44	0.497	
Total	65.9	34.1	0.66	0.441	
Awareness					
Do you know about the MyGAP (aquaculture) certificate introduced by the Department of Fisheries (DOF)?	39.1	60.9	0.39	0.488	0.724
Have you seen the MyGAP logo?	39.7	60.3	0.40	0.490	
Do you know the meaning of the MyGAP logo?	15.8	84.2	0.16	0.365	
Total	31.5	68.5	0.32	0.448	

In this study, we ask consumers to rate their level of agreement with statements about green consumerism on a 6-point scale, ranging from "strongly disagree" (1) to "strongly agree" (6). A Cronbach's Alpha of 0.795, reported in **Table 3**, indicates that the green consumer behaviour construct is internally reliable. In detail, we can see that the majority of respondents are very particular about the origin of the fish, the input used in the production, and the quality of the product before purchasing aquaculture products, as indicated by the mean score values ranging from 3.00 to 4.28.

Table 3. Green consumer behaviour.

Indicator	Green Consumer Behaviour (%)						Mean Score	S.D.	Cronbach Alpha
	1	2	3	4	5	6			
Knowing the origin of farmed fish is important for me to buy farmed fish.	5	11.9	23.1	20.8	18	21.2	3.99	1.479	0.795
Knowing the input (food source given to the fish) is one of the criteria for me to buy farmed fish.	3.6	11	21.1	20.6	20.5	23.3	4.13	1.447	
Choosing a good (high quality) farmed fish is important to me before buying it.	2.9	9.8	18.4	20.2	22.8	25.9	4.28	1.425	

4.3. Perception on MyGAP-Compliant Farmed Fish

According to the results of our online survey, 85% of the respondents intend to purchase MyGAP-compliant farmed fish if it becomes available on the market. However, 15% of the respondents indicate the opposite. The majority of respondents report no preference between MyGAP-compliant and non-MyGAP-compliant farmed fish. **Figure 1** depicts the percentage of respondents indicating various reasons for not choosing MyGAP-compliant farmed fish.

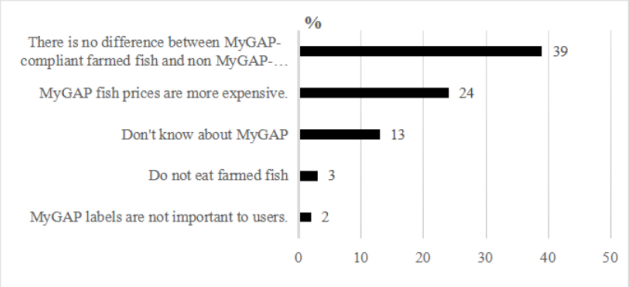

Figure 1. Frequency distribution of consumers based on the reasons why they do not want to choose MyGAP-compliant aquaculture produce.

The majority of respondents who chose to purchase MyGAP-compliant farmed fish had a preconceived notion about the quality of farmed fish produced by the farmer. Respondents were asked seven broad questions concerning their perceptions of MyGAP-compliant farmed fish, as shown in **Table 4**. Most consumers agreed that MyGAP-compliant produce was clean, safe, had better quality, was good for health, and was recognized by health authorities, compared with non-MyGAP-compliant produce. This is supported by the mean score values, which range from 4.45 to 4.53. Regarding fish choice, most respondents would encourage their family and friends to choose MyGAP-compliant farmed fish, with a mean score value of 4.49. In terms of keenness to buy, however, most respondents disagree that they would be among the earliest to purchase MyGAP-compliant farmed fish if it were supplied in the market, as indicated by a mean score of 2.53. The majority (73.6%) selected a rating of 1-3 for this statement. This result is perhaps not surprising, as more than two-thirds of the respondents still hold positive views on other indicators.

Table 4. Consumers' perception on MyGAP-compliant farmed fish.

Indicator	Percentage of Respondents (%)						Mean Score	S.D.
	1	2	3	4	5	6		
I believe that MyGAP-compliant farmed fish is cleaner than non MyGAP-compliant farmed fish.	1.9	5	16.3	20	28.5	28.4	4.53	1.29
I believe that MyGAP-compliant farmed fish is safe to eat.	2.9	3.9	16.6	19.7	28.2	28.7	4.53	1.32
I believe that MyGAP-compliant farmed fish has better quality than non MyGAP-compliant farmed fish.	2.2	4.7	16.1	20.5	29.3	27.3	4.52	1.29
I believe that MyGAP-compliant farmed fish is good for health.	2	4.7	18.3	20.5	30.5	24	4.45	1.27
I believe that MyGAP-compliant farmed fish are accepted and recognized by the health authorities.	2	5.3	16.4	20.2	30.1	26	4.49	1.29
I will encourage my family and friends to choose MyGAP-compliant farmed fish.	2.5	3.9	17.1	21.9	28.1	26.7	4.49	1.29
I will be among the earliest to buy MyGAP-compliant farmed fish if it is supplied in the market.	26	27.9	19.7	17.4	6.2	2.8	2.58	1.35
Cronbach's Alpha	0.82							

Notes: Perceptions based on a of scale 1 (strongly disagree) to 6 (strongly agree).

4.4. WTP for MyGAP-Compliant Produce

Respondents' WTP is measured by asking them how willing they are to pay for MyGAP-compliant farmed fish at each of the 5 bid prices, using the African Catfish as the experimental product. **Table 5** lists the number of "Yes" and "No" responses (i.e., whether or not they are willing to pay) across the 5 bid prices. We can see a skewed distribution, where at almost every price level, more than three-quarters of the respondents are willing to pay for MyGAP-compliant African Catfish. The CVM method enables the observation of sensible responses to the different bid prices.

Table 5. Frequency distribution WTP for MyGAP African Catfish.

Response	Bid Price				
	RM8	**RM10**	**RM11**	**RM13**	**RM15**
Yes	92.3	78.7	83.4	78.8	73.0
No	7.7	21.3	16.6	21.2	27.0
No. of obs (n)	144	149	157	111	112

Table 6 presents our model estimation results, which explain how consumers' WTP for MyGAP-compliant farmed fish can be attributed to various factors. The model specification is statistically significant, and the model fit is acceptable, as indicated by the Pearson χ^2 goodness-of-fit measures. In the first model specification (Model 1). The number of households and the number of farmed fish species consumed are statistically significant at the 5%. In contrast, household income, bid price, consumers' awareness of MyGAP, and consumers' perception of MyGAP-compliant farmed fish are statistically significant at the 1% level. Consumers' knowledge of aquaculture and green consumer behaviour is statistically significant at the 10% level. However, age and educational level are found to be statistically insignificant. We also include a second model specification (Model 2) for robustness checking, i.e., our two key explanatory variables—MyGAP awareness and perception— do not differ much in terms of magnitude, sign, and statistical significance. This indicates the decent robustness of our models.

Table 6. Binary logistic model estimation output.

	Model 1		**Model 2**	
	Coeff	**dy/dx**	**Coeff**	**dy/dx**
Age	0.010 (0.011)	0.001 (0.001)		
Household size	−0.147** (0.070)	−0.018** (0.008)		
Education level	0.054 (0.069)	0.007 (0.008)		
Total household income	0.896*** (0.321)	0.114*** (0.040)		
#farmed fish species eaten	0.175** (0.071)	0.022** (0.008)		
Bid price	−0.252*** (0.051)	−0.032*** (0.006)		
Aquaculture knowledge	0.010* (0.005)	0.001** (0.0006)		
Green behaviour	0.011* (0.006)	0.001* (0.0007)		
MyGAP awareness	0.010*** (0.003)	0.001*** (0.0004)	0.012*** (0.003)	0.001*** (0.0004)
MyGAP perception	0.024*** (0.006)	0.003*** (0.0007)	0.028*** (0.004)	0.004*** (0.0006)
Pearson χ2 goodness-of-fit	607.55		111.48	
#observations	644		645	

Notes: Significant at the ***1%, **5%, and *10% levels.

As for marginal effects, model 1 highlights the practical impact of each predictor. Household size reduces the probability of WTP by 1.8 percentage points, while household income increases it by 11.4 points. Each additional farmed fish species consumed raises WTP by 2.2 points, whereas each RM1 increase in bid price reduces it by 3.2 points. Aquaculture knowledge and green behaviour increase WTP slightly (by 0.1 point each). MyGAP awareness and perception add 0.1 and 0.3, points respectively.

Aquaculture knowledge and green behaviour contribute smaller yet statistically significant positive effects (dy/dx = 0.001 each), suggesting that increased awareness and environmentally friendly behaviour support WTP. MyGAP awareness and perception also enhance WTP, with marginal effects of 0.001 and 0.003, respectively, indicating that promoting familiarity with certification and positive consumer perception could encourage acceptance. Model 2 confirmed the robustness of these findings, with both awareness and perception remaining significant and showing slightly higher coefficients and marginal effects: MyGAP awareness (β = 0.012, dy/dx = 0.001), and MyGAP perception (β = 0.028, dy/dx = 0.004).

5. Discussion

Looking first at the sociodemographic variables, household size has a negative and significant relationship with WTP for MyGAP-compliant farmed fish. Larger households are unwilling to pay more, plausibly due to the relatively higher cost burden. This result is consistent with Nayga and Capps [54], who argued that larger households may prioritise budget constraints, leading to lower acceptance of price premiums. In contrast, Nguyen et al. [55] and Solgaard and Yingkui [56] found no significant effect of household size, suggesting that cultural or contextual differences may be at play.

On the other hand, household income has a positive and significant relationship with WTP, such that respondents from higher income households are more willing to pay extra for MyGAP-compliant farmed fish. This result aligns with findings from numerous other studies, such as Nguyen et al. [55], Solgaard and Yingkui [56] and Haghiri [57], which have all documented that increased income facilitates ethical, health-conscious, and sustainable purchasing decisions. This is further confirmed by recent evidence from Smetana et al. [11], who showed that income is a consistent driver of consumer WTP for eco-labelled aquaculture products.

In terms of age and educational level, we find no significant relationship with the WTP. Previous research has produced mixed results. Most previous studies, including Solgaard and Yingkui [56], Zander and Feucht [48], Yadav and Pathak [19], Hjelmar [58], Budak et al. [59], find age to be positively related to WTP. In contrast, Teshome [60] find that age is negatively related to WTP. Most studies, including Thøgersen et al. [17], Hjelmar [58], Budak et al. [59], and Teshome [60], find no significant relationship between education level and WTP. However, several studies, including Zander and Feucht [48] and Yi [61], find that education is positively related to WTP. Previous research has also found that education level is negatively related to WTP [29, 56].

WTP is positively influenced by consumer preferences for farmed fish, as indicated by the number of farmed fish species consumed. This finding aligns with Olesen et al. [62] and Xuqi et al. [63], who noted that product familiarity enhances trust and reduces perceived risk. Promotions related to aquaculture activities, types of farmed fish species, and the benefits of farmed fish should therefore be promoted to the community in order to pique their interest and encourage them to consume farmed fish. On the other hand, the Fisheries Department and aquaculture farmers could collaborate with hotels, resorts, and restaurants nationwide to promote farmed fish, such as by including it on their main menus.

The negative influence of bid price is consistent with classical economic theory and empirical results by Mezgebo [64] and Mahirah [65] and more recently Vitale [66], who have shown that increasing the price significantly decreases WTP for eco-labelled seafood. Our results also show that consumers' knowledge of aquaculture, green consumer behaviour, awareness of MyGAP and perception of MyGAP-compliant farmed fish are positively related to WTP for MyGAP-compliant farmed fish. Previous literature suggests how knowledge and awareness play a pivotal role in influencing consumers' information search and usage, and ultimately their food purchase decision-making [67–70]. The positive relationship between green consumer behavior and WTP indicates a shift in consumer behaviour toward green attitudes. Being particular about the origin of farmed fish, the use of input at the farm level, and the quality of farmed fish might help boost the demand for MyGAP-compliant farmed fish. This is consistent with the Perceived Consumer Effectiveness (PCE) concept. This concept allows us to evaluate how consumers gauge their ability to influence environmental issues. Positive correlations have been found between PCE, ethical concerns, and fish sustainability [71]. It has also been documented that consumers who prioritise sustainability issues are also those who prefer certified organic products [19]. These suggest a positive relationship between consumers valuing ethical issues and their inclination towards purchasing green product.

Notably, MyGAP awareness and perception emerged as the most influential predictors of WTP in this study. This finding is consistent with earlier studies, such as Janssen [10] and Batte et al. [12], which have shown that familiarity and trust in certification schemes enhance consumer support for certified food products. More recent evidence by Smetana et al. [11] and Lam et al. [13] further supports this view, noting that con-

sumer recognition of certification logos significantly affects price premiums. Smetana et al.[11] highlighted that awareness and perception are critical drivers explaining a substantial portion of the variation in consumer preferences for certified seafood. These findings collectively reinforce the importance of building consumer familiarity and trust in certification programs to increase market demand for certified aquaculture products effectively.

6. Conclusion

The objective of this study is to examine how awareness and perception of MyGAP products affect consumers' WTP for MyGAP-compliant farmed fish. Our findings show that, in addition to common variables, such as income level, consumer preferences, and price, awareness variables, including aquaculture knowledge, green consumer behaviour, and MyGAP awareness are also important in influencing WTP for MyGAP-compliant farmed fish. These findings suggest that increasing awareness of MyGAP can help catalyse producers to implement more sustainable aquaculture production activities and shift attitudes toward prioritising MyGAP-compliant farmed fish in their daily protein source choices. Consumption patterns and consumer behaviour can impact the use of natural resources and the quality of aquaculture products.

Empirical evidence from the marginal effects analysis confirms that consumers with higher awareness and favorable perceptions are more likely to express WTP for certified aquaculture products. Notably, over 73% of respondents indicated a willingness to pay a premium price for MyGAP-compliant farmed fish. This finding is consistent with those of Janssen and Hamm[10] and Smetana et al.[11], who reported that consumers familiar with eco-labels and food certification schemes are more likely to accept higher prices for sustainably produced food. Similarly, Batte et al.[12] found that increased consumer knowledge positively correlated with premium WTP for traceable and certified agricultural products. The results also align with Zhang et al.[41], who emphasized that socio-economic factors such as income and education enhance the translation of perceived value into actual purchasing decisions. Mashhad[44] further observed that consumers with better comprehension of food labels—especially in urban contexts—were more inclined to prioritize certified options over conventionally produced goods.

This shift in consumer attitudes implies an emerging preference for food attributes related to safety, health, and environmental sustainability. Policy interventions that enhance public understanding of MyGAP certification could therefore indirectly catalyze higher adoption rates among aquaculture producers, as increasing demand generates a market-driven incentive for compliance. To support this market transformation, a robust and visible labeling mechanism is essential to differentiate MyGAP-compliant farmed fish from non-MyGAP-compliant farmed fish in the market. A price premium, calibrated to reflect additional certification-related costs (e.g., pond renovation, infrastructure upgrades, and input quality standards), must be transparent and equitable. As noted by Grunert[15], the credibility and clarity of labeling play a critical role in building consumer trust and justifying higher prices. If all the criteria are fulfilled and prices are fairly set, there is no reason for producers not to practise MyGAP. To achieve the goal of sustainable aquaculture development, the government must play an enforcement role in ensuring that producers fully adopt MyGAP and that there are no excessive price increases in the market for MyGAP-compliant farmed fish.

Furthermore, consistent with the work of Thøgersen et al[17], emphasizes the importance of consumer education in reinforcing sustainable food systems. Public awareness campaigns, school-based programs, and media engagement can help establish a solid knowledge base that encourages green consumer behavior. Over time, increased participation in ethical consumption can promote greater sustainability in the aquaculture industry, improve product quality, and support environmental conservation. Through education comes understanding. With understanding, it is hoped that consumers wil be more willing to pay for sustainable aquaculture products. Farmers who invest in good aquaculture practices would also inevitably reap benefits. Consumer participation in green consumer movements is vital in increasing demand for green products. Along the way, educating the public would help strengthen

the aquaculture industry, improve product quality, and contribute to environment conservation.

In conclusion, this study makes an empirical contribution to the growing literature on certified aquaculture and sustainable food systems. It highlights the interconnectedness of consumer knowledge, perception, and behavior in driving demand for certified products. These findings suggest that policies aimed at increasing awareness and strengthening certification systems can play a pivotal role in accelerating the transition toward a more sustainable aquaculture sector in Malaysia and beyond.

Author Contributions

Conceptualization, R.K.; methodology, R.K. and R.M.; formal analysis, R.K. and R.S.; data curation, J.J.S.; writing-original draft preparation, R.K..; writing-review and editing, R.K. and J.J.S.; project administration, R.K.; funding acquisition, R.K. and J.J.S. All authors have read and agreed to the published version of the manuscript.

Funding

This research was supported by the Ministry of Higher Education (MoHE) Malaysia through the Fundamental Research Grant Scheme (FRGS/1/2019/SS08/UUM/02/2).

Institutional Review Board Statement

Not applicable.

Informed Consent Statement

Not applicable.

Data Availability Statement

The dataset associated with this study is stored in a secure and accessible Google Drive repository, designed to facilitate access to the survey responses used in this research. This repository serves to ensure transparency, reproducibility, and support for further academic exploration by allowing researchers to review and utilize the data under appropriate conditions. Ethical guidelines govern access to the dataset to protect participant confidentiality. It is available upon request by contacting the corresponding author via email.

Acknowledgments

The authors would like to express their sincere gratitude to the Ministry of Higher Education (MoHE) Malaysia for supporting this research through the Fundamental Research Grant Scheme (FRGS/1/2019/SS08/UUM/02/2). We also extend our heartfelt appreciation to the research assistants whose dedication and hard work contributed significantly to the completion of this study.

Conflicts of Interest

The authors declare that they have no conflict of interest. The funders had no role in the design of the study, in the collection, analysis, or interpretation of data, in the writing of the manuscript, or in the decision to publish the results.

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