Consumer Acceptance and Willingness to Pay for Prebiotic Kuini Juice in Malaysia

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ABSTRACT

Changing consumers' lifestyles and food consumption patterns provide an excellent opportunity to develop the prebiotics market in Malaysia. Therefore, Malaysia is trying to improve products based on local ingredients such as kuini juice developed by the Malaysian Agricultural Research and Development Institute (MARDI). The high fibre content found in kuini makes it suitable to be used as one of the essential ingredients in prebiotic drinks. This research attempted to analyse consumer acceptance and willingness to pay for prebiotic kuini juice. A survey was conducted in Peninsular Malaysia, where 400 respondents were interviewed using a structured questionnaire. Exploratory factor analysis, Kaiser-Meyer-Olkin test and Bartlett's Test of Sphericity were utilised for objective analysis 1, while the Contingent Valuation Method was utilised for objective analysis 2. The result showed that 73% of respondents had taken prebiotic juice in the past. The tendency to choose prebiotic kuini juice by MARDI was 52% compared to existing products in the market. Significant findings determined consumers' preference factors, including product marketing and promotion, which influenced the purchasing of prebiotic kuini juice. The willingness to pay by respondents was lower at RM4.10/300ml bottle than the actual price bid at RM5.70/300ml bottle. As consumer awareness of health increases, it was an opportunity for the health food industry to expand the functional food market. However, some improvements should be adjusted to ensure prebiotic kuini juice can compete with other similar products in the market. Government support is needed to encourage indigenous fruits cultivation and to produce value-added products.

Introduction

Nowadays, consumers are interested in buying healthy products, influenced by lifestyle, social media, and awareness of healthy food consumption. Prebiotics is one of the health products that are increasingly gaining attention globally. It is defined as undigested food ingredients beneficial to the 'host' to promote the growth or activity of certain bacteria in the colon (Gibson & Roberfroid, 1995). The global prebiotics market demand was 623.5 kilotons in 2015, while the value was USD 3.4 billion in 2018 and is forcasted to reach USD

8.34 Billion by 2026. The Compound Annual Growth Rate (CAGR) of market demand growing at 8.0% from 2016 to 2024. European market dominated the global prebiotics industry and is expected to witness a CAGR of 10.2% from 2016 to 2024, followed by North America with a CAGR of 9.7% for the same period. The Asia Pacific market anticipated witnessing a CAGR at 10.7% from 2016 to 2024, demand-driven by high population countries such as China, and India. In addition, the prebiotics market in Australia is driven by a search for food-based drug substitutes and combat-related lifestyle diseases (GlobeNewswire, 2020).

The prebiotic industry in Asia is gaining momentum (Scott *et al.*, 2020), including Malaysia. Changes in consumer taste towards a balanced diet in Malaysia impact the increasing demand for prebiotic products. There was a various initiative in line with the increase in prebiotic consumption such as the production of prebiotic beverages by The Malaysian Agricultural Research and Development Institute (MARDI). MARDI is in the process of launching a new beverage product, the prebiotic kuini juice. Kuini or its scientific name Mangifera Odorata is one of the indigenous fruits in Malaysia. Among the features of kuini juice products that MARDI will release are the followings: i) supports a soluble a high-fibre diet that conforms to the feature of prebiotic products; ii) following the low glycemic index (GI), which is suitable for diabetes; and iii) ready to drink product

The daily fibre intake in Malaysia is still low. The Malaysian Dietetic Association recommends a dietary fibre intake of 25g per day, and out of this number, 7g to 13.5g is necessary from a soluble fibre source such as grains, nuts, fruits and vegetables (Markowiak & Śliżewska, 2017). The prebiotic kuini juice is high in fibre (3.5g/100ml). The daily intake of juice by 300 ml provides 10.5 grams of soluble dietary fibre, which exceeds the minimum recommendation of daily dissolved dietary fibre. The positive effect of prebiotic on health is associated with a decrease in the incidence of some diseases, including cardiovascular disease, by stabilising cholesterol, blood sugar, body fat content. Plus, it is a good food source for the good bacteria in the gut (Zhou *et al.*, 2015: Slavin, 2013). The high demand and attention driven by ready-to-drink products are due to various factors, including being consumed directly and the ease of carrying and modification by size and shape according to customer preferences.

Therefore, research related to consumer acceptance and willingness to pay is essential before new products are launched, especially in the healthy drinks category. The study aims to identify consumer acceptance and willingness to pay for prebiotic kuini juice developed by MARDI.

Consumer Acceptance

Market pre-validation is an evaluation activity in the industry to gather feedback and improve the product based on suitability and industry needs to ensure the products are ready for the commercial phase (Olsen, 2015). This process is vital to reduce the risk of product failure in the commercialisation phase. The failure happened when the gut feeling was used in the research area. It was a situation where the technologies developed based on technology push and not by demand-pull. According to Andreessen (2019), the product-market fit needs to ensure that the products meet consumers' demands. Therefore, the Product-Market Fit Pyramid is applied, which contents of six steps hierarchical for completing product-market validation and achieving product-market fit as presented in Figure 1 below. There are two layers of Product-Market Fit Pyramid, namely market and product. Market elements target consumers and underserved needs. While products elements include value proposition, feature set and user experience.
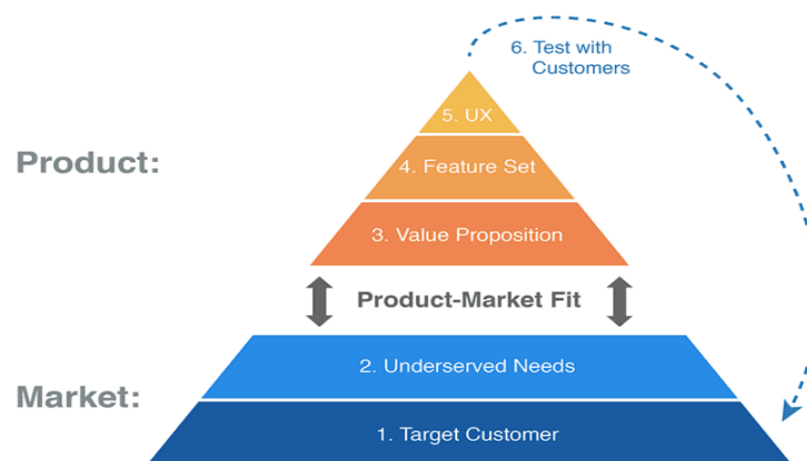
Source: The Lean Product Playbook (Olsen, 2015)
Figure 1. Product-Market Fit Pyramid

Lim & Goh (2019) examined attitudes, subjective norms, perceived behavioural control, brand, awareness, and belief, influencing the intention to buy healthy drinks among urban consumers in Malaysia. The results supported the standard Theory of Planned Behaviour model's attitudes, subjective norms, and behavioural control. Belief as an additional determinant has also been shown to influence consumers' purchasing intentions towards healthy beverages. Beliefs and awareness also have a positive and significant relationship with consumers' attitudes toward healthy drinks. Surprisingly, brand and awareness were insignificant in influencing consumers' purchasing intentions toward healthy beverages.

Willingness to Pay

Knowledge of the willingness to pay for products on behalf of potential consumers plays a vital role in many areas of marketing management, such as pricing decisions or new product development. Willingness to pay is the amount of money that represents the

difference between consumer surplus before and after adding or improving food product attributes (Rodríguez *et al.*, 2007). Several studies on willingness to pay for healthy food products have been conducted across the globe. Analysis of the study by Ali & Ali (2020) showed that 44% of consumers were willing to pay an average of 9% additional price to purchase the health and wellness food products they desire. The demographic variables (income and education) were more likely to influence consumers' willingness to pay for healthy food products. Health awareness was a major psychological factor for buyers that influenced their willingness to purchase, followed by product quality, taste, finish, and price. Consumers found convenience in shopping and were less influenced by market supply or in-store sales assistance. Another study conducted by (Talati *et al.*, 2017) showed that consumers were willing to pay a higher price if the front pack label of health food products is displayed compared to the pack label without health information.

Method

Data analysis was conducted on 400 respondents using a structured questionnaire and face-to-face interviews. The sampling size focuses on the population in Peninsular Malaysia and is selected by stratified random sampling technique to ensure the subgroup represented the N population. The sample size is divided into four states in Malaysia, North (n=100), South (n=100), West (n=100) and East (n=100) and the major survey locations included malls and hypermarkets. These are the number of individuals out of the population who will participate and achieve the required sampling size based on the expected response rate. The sample size is adequate for statistical analysis to be conducted, and more conclusive inferences can be made from the findings. The number is also appropriate, considering the time and resource constraints of this research.

To identify consumer acceptance of prebiotic kuini juice

The Product-Market Fit Pyramid is utilised to ensure the products meet consumers' demands. Interviews, focus group discussions, and surveys were part of product testing to measure consumers' preferences. Food testing is conducted for two juice samples, including prebiotic kuini juice and product from the market with sensory characteristics equivalent to prebiotic kuini juice. Respondents must taste the samples provided to evaluate the attributes such as colour, sweetness, sourness, fruit flavour, aroma, viscosity, fibre, and after taste. Respondents answered the question by marking the preferred answer based on the Likert Scale as 1 = Strongly Dislike, 2 = Dislike, 3 = Not Sure, 4 = Like, and 5 = Very Like.

Exploratory Factor Analysis (EFA), Kaiser-Meyer-Olkin (KMO) test, and Bartlett's Test of Sphericity are utilised to analyse consumer acceptance of prebiotic kuini juice. EFA is

used to discover the underlying structure of observed variables (Mvududu & Sink, 2013). The items are reduced to a small set of underlying factors that summarise the essential information contained in the variables. KMO test and Bartlett's Test of Sphericity were conducted to verify whether the data set was suitable for factor analysis. The tests measure the sampling adequacy to determine the factorability of the matrix or data set as a whole (Richard & Dean, 2007). The data set of factorability can be assumed to exist when the value of Bartlett's Test of Sphericity is large and significant while the KMO value is greater than 0.50. Factor loading is the correlation coefficient for the variable, and it explains the variance by the variable on that particular factor. The value must exceed 0.3, while eigenvalues must exceed '1' to be classified as one factor. The communality value for each item must be within the 0.3 range to confirm whether all factors extracted from this analysis are reliable or not, as suggested by MacCallum *et al.* (1999).

To identify willingness to pay for prebiotic kuini juice

The regression model to determine the actual value of the Willingness to Pay (WTP) is based on A. Krystallis & Chryssohoidis (2005) that can be stated as follows:

$$WTP = \frac{[\beta_0 + (\beta_2 X_2 + \beta_3 X_3 + ..., \beta_k X_k)]}{\beta_1} \tag{1}$$

When B_0, B_2, B_3, B_K and B_1 represent the coefficient values for constant, bid price, producer, income, education and age, respectively. The respondent's vote cannot influence such provision; truth-telling is in the respondent's best interest (Hoehn & Randall, 1987). This method can estimate the probability of answering YES for the independent variable-rate bid, and some assumptions made regarding the upper limit values and lower limits for each bid rate are integral. The probability of saying 'YES' is one (1), while the probability of saying 'NO' is zero (0). As a result, the negative value of WTP can be deducted, and zero is used as a lower limit value.

The study utilised the Contingent Valuation Method to estimate the population's value on a good. The approach asked their WTP to obtain a specified good or Willingness to Accept (WTA) to give up a good, rather than infer from observed behaviours in regular marketplaces. The dichotomous choice approach mimics behaviour in traditional markets where people usually purchase or decline the purchase, which is good at the posted prices. The method has also been shown to be incentive-compatible, proved that respondents understood the excellent provision depends on most votes.

Result and Discussion

A total of 400 surveys were completely conducted. Table 1 presents the background characteristics of respondents. The study found that 68% of the respondents involved in

this study were above 40 years old. In addition, 59% of respondents had higher education, while the rest had a secondary school level or below education. Respondents working in the private sector were 35%, 32% in the government sector, 12% were self-employed, and the rest were retirees, housewives or students. The Malaysian household income group consist of three income groups range, namely B40, M40 and T20. 72% of respondents fall in the B40 with an income less than RM4,850. 22% of respondents fall in the M40 group with an income range of more than RM5000 and less than RM10,970. The rest are respondents from the T20 group, with an income range exceeding RM10,971 (DOSM, 2020).

Table 1: Demographic profile of consumer survey (n=400)

Characteristic		*%*
Age	<=20	7
	21-30	30
	31-40	31
	41-50	22
	51-60	7
	>60	3
Education Level	No formal education	1
	Primary school	2
	Secondary school	38
	Higher education	59
Job	Government	32
	Private	35
	Self-employed	12
	Retiree	4
	Housewife	6
	Student	11
Household Income	< RM2,500	41
	RM2,501 - RM4,850	31
	RM4,851 - RM7,100	13
	RM7,101 - RM10,970	9
	RM10,971 - 15,040	5
	> RM15,041	1

Consumer Acceptance towards Prebiotic Kuini Juice

The survey was conducted on two products, including prebiotic kuini juice drinks developed by MARDI and a randomly selected juice from the market with similar attributes to identify consumers' acceptance. The potential for functional foods is promising, as consumer generally wants to buy healthy food (Brunsø *et al.*, 1996). Still, at the same time, consumers are reluctant to change their unhealthy eating habits (Williamson *et al.*, 2000). These statements align with this study results; a field survey showed that 54% of

respondents knew of functional foods, proving awareness of functional foods among Malaysians. However, 47% had consumed the products.

Table 2: Statistical Descriptive Analysis of Prebiotic Juice

Attribute	Prebiotic Kuini Juice		Existing Product	
	Mean	**Sd. Deviation**	**Mean**	**Sd. Deviation**
Colour	3.98	0.895	4.14	0.786
Sweetness	3.91	0.950	3.97	0.902
Sourness	3.78	0.962	3.93	0.954
Fruit Flavour	4.21	0.831	4.08	0.918
Aroma	3.90	0.999	3.85	0.993
Viscosity	3.89	1.089	3.87	0.982
Fibre	4.02	0.906	3.84	0.948
After Taste	3.97	0.972	4.04	0.939

Note: 1 = Strongly Dislike, 2 = Dislike, 3 = Neutral, 4 = Like and 5 = Very Like

The survey indicated that 73% of respondents had consumed prebiotic juice, while the rest had never drunk it. Consumers preferred the features of MARDI products such as fruit flavour, aroma, viscosity and fibre compared to existing products in the market, as shown in Table 2. The tendency to choose between these two products also showed that 52% of respondents chose prebiotic kuini juice compared to existing products in the market.

Table 3: Factor influencing the purchase of Prebiotic Kuini Juice

Items	Factor	
	Product and Marketing	**Promotion**
Price		0.786
Discount		0.819
Brand		0.570
Packaging size (300 ml, 1,000 ml)		0.504
Labelling	0.616	
Type of packaging (glass bottle, plastic bottle, box)	0.547	
Nutritional value	0.611	
Producer (local, imported)	0.669	
Advertisement channel (Social, electronic, printed media)	0.727	
Advertisement time	0.613	
Eye's level	0.680	
Easy to access	0.659	
Marketing channel (online, conventional, conventional)	0.703	
Eigenvalue	5.199	1.300
Variance (%)	39.995	10.000
Cumulative of variance (%)	39.995	49.995
Kaiser-Meyer-Olkin	0.881	
Bartlett's Test of Sphericity	0.000	

Out of the 14 variables analysed in Table 3, the Kaiser-Meyer-Olkin test provided a value of 0.881, while the Barlett's test result was significant at 0.01 (p-value = 0.000). These values showed that factor analysis could identify the main factors that influence prebiotic kuini juice purchase. Eigenvalues exceeding 1.0 are considered factors that influence the purchase. The analysis has reduced the number of original variables to new factors. Thirteen items were extracted into two factors; both described as 50% variance in the study—these factors were categorised as Product and Marketing and promotion. Hence, it can be concluded that even though consumers knew about functional foods, it was not a determinant factor for consumers to shift to a healthy daily lifestyle.

The first factor labelled as Product and Marketing explains 40% of the total variance. Nine variables represent this factor, and two of them provided a high correlation value (> 0.7), namely the marketing method (0.703) and advertising channel (0.727). The results indicated that 60% of respondents agreed to make sales available online due to the ease of access. 67% of respondents also agreed that advertising channels had targeted them through social media. The second factor is labelled as promotion which explains 9.80% of the total variance. Four variables represent this factor, and three provided a high correlation value of more than 0.7. The variable with a very high correlation value (> 0.8) is the discount given to the buyer (0.819), while the high correlation value (> 0.7) is the price offered (0.786). Consumer acceptance of this study differs from several previous studies that showed knowledge of the benefits of prebiotic products and awareness of healthy foods play an essential role in consumer purchasing (Arora, 2020; Yilmaz-Ersan *et al.,* 2020). These differences may be due to variations in the types of prebiotic products studied.

Willingness to pay for Prebiotic Kuini Juice

In general, willingness to pay is the maximum amount a consumer can pay to acquire goods or services. Table 4 shows the actual price bid is RM5.70/ bottle(300ml); however, after analysing the WTP formula, respondents' price willing to be paid is only RM4.10/bottle (300ml). Moreover, local producers are more significant than international producers in the selection of prebiotic beverage products. Income significantly influences their WTP while age is not significant. The findings are consistent with the economic theory, which shows that demand will decline when prices rise, and WTP will decline as the prices asked of respondents' increase (Hanley & Barbier 2009). It also means that the higher the bid value offered increases the responses' resistance to paying for prebiotic kuini juice developed by MARDI.

Table 4: Consumers' Willingness to Pay, n=400

	B	*S.E.*	*Wald*	*df*	*Sig.*	*Exp(B)*
Bid Price	-0.203	0.070	8.478	1	0.004	0.817
Producer	0.877	0.310	8.024	1	0.005	2.405
Income	-1.303	0.770	2.864	1	0.091	0.272
Education	-0.408	0.240	2.880	1	0.090	0.665
Age	0.278	0.258	1.162	1	0.281	1.320
Constant	0.129	0.417	0.095	1	0.758	1.137
−2 Log likelihoods			459.381			
Cox and Snell R Square			0.062			
Nagelkerke R Square			0.088			

Conclusion

This study identifies the acceptance of consumers and willingness to pay towards the products developed by MARDI based on selected indigenous fruits. Food testing conducted on prebiotic kuini juice and an equivalent product selected from the market showed consumers are fond of the characteristics of MARDI product in terms of fruit taste, aroma, viscosity and fibre. The response on willingness to pay indicated that consumers would pay lower than the price that has been set. As consumer awareness of health increases, it was an opportunity for the health food industry to expand the functional food market. However, raw materials present a significant challenge in the production of the product. Furthermore, government support is needed to encourage the cultivation of indigenous fruits in Malaysia by providing seed subsidies and financial resources to farmers to expand and increase the supply of these raw materials to produce value-added products. Agencies/private companies' involvement as industrial driven is needed to create intensive/commercial plantations to commercialise downstream products based on indigenous fruits. Moreover, collaboration between research institutions and companies is crucial to catalyse the development of this industry through consumer awareness campaigns and by the creation of a market segment. Feedback on commercial prospects provided by the company/ industry is vital to ensure that the products meet consumers' needs from an industry perspective. The study is essential in helping future researchers in determining functional food production. The selection of raw materials that contain high nutrients can attract consumers to use healthy food products. The intervention of the authorities is vital in increasing the awareness of consumers in Malaysia about the benefits of functional food intake.

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