

Consumers' purchase intention towards probiotic fortified *kuini* juice: A preliminary study

(Niat pembelian dalam kalangan pengguna terhadap minuman jus kuini berciri prebiotik: Kajian rintis)

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Keywords: consumer, purchase intention, probiotic fortified *kuini* juice, local fruit

Abstract

This preliminary study aimed to explore sensory attributes influencing consumer's purchase intention towards a new indigenous Malaysian fruit product, probiotic fortified *kuini* juice developed by MARDI. A survey was conducted based on convenience sampling involving 100 respondents in Klang Valley by using structured questionnaires. The attributes evaluated were taste, colour, appearance, aroma, viscosity and overall acceptance. The results revealed that taste and overall acceptance significantly influenced purchase intention. In addition, there were statistically significant associations between demographic factors (ethnic, age, education and gender) and respondent's knowledge on prebiotics, consumption of indigenous fruits and perceived health benefits. This study provided important insights for the industry players especially potential entrepreneurs on the consumer's preferred attributes and purchase intention for the product development and effective marketing strategy when the product is ready to be commercialised.

Introduction

Nowadays there is greater awareness on Malaysian consumers towards willingness to purchase healthy food which is influenced by lifestyle adaptation, social media and food consumption awareness (Hassan et al. 2020). The growing interest in nutritional benefits are becoming important in purchase decision (Harrington 1994) coupled with consumers' willingness to compromise their health (Bourn and Prescott 2002; Hossain and Onyango 2004; Bogue et al. 2005; Verbeke 2005, 2006). According to Hasler (2002), there is a variety of categories for foods with nutritional benefits such as functional, fortified, nutrient-

rich/enriched, biofortified, genetically modified (GM) and biofortified or second-generation GM foods or nutraceuticals. This study examines the consumers' purchase intentions on probiotic fortified *kuini* juice.

Prebiotics as potential health benefits from Mangifera odorata (Kuini)

Prebiotics is defined as a non-digestible food ingredient that beneficially affects the host by selectively stimulating the growth and/or activity of one or a limited number of bacteria in the colon (Gibson and Roberfroid 1995). Prebiotics also means 'before' or 'for' (Gibson and Roberfroid

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1995). Normally the prebiotics can be found in fruits, vegetables, cereals, and other edible plants that are sources of carbohydrates which constitute potential of prebiotics (Markowiak and Ślizewska 2017). Prebiotics is one of the segments included among the eight functional food ingredients (probiotics, proteins and amino acids, phytochemicals and plant extracts, fibres and specialty carbohydrates, omega-3 fatty acids, carotenoids, vitamins and minerals). Markets and Markets Research Private Ltd. (2020) reported that the functional food ingredients market was valued at USD64.75 billion in 2017 and projected to reach USD94.21 billion by 2023, with CAGR of 6.6% during the forecast period (Figure 1). Besides, increased consumption of nutritive convenience food and fortified food as well as growth in health awareness among consumers has led to increased consumption of healthier diets.

The functional ingredient (prebiotic) of this product is from *Mangifera odorata* (*kuini*) which is a hybrid between *M. indica* and *M. foetida* (*bacang*) (Teo et al. 2002) and it is included in the eight species of indigenous *Mangifera* which was discovered in Malaysia (Porcher 2005). *Kuini* is an indigenous or underutilised fruit which is neither grown commercially on a large scale nor widely traded (Nandal and Bhardwaj 2014). They are cultivated, traded and consumed locally. In Malaysia, almost 95% from 370 species of fruits are categorised as indigenous fruits (Rukayah 2006). There are 10 types of indigenous fruits, such as *Garcinia atroviridis* (locally known as *asam gelugur*), *M. foetida* (*bacang*), *Annona muricata* (*durian belanda*), *Pithecellobium jiringa* (*jering*), *M. odorata* (*kuini*), *Bouea macrophylla* (*kundang*), *Parkisa speciosa* (*petai*), *Nepheleium rambutan-ake* (*pulasan*), *Baccaurea motleyana* (*rambai*) and *Salacca zalacca* (*salak*) (Raziah 2008).

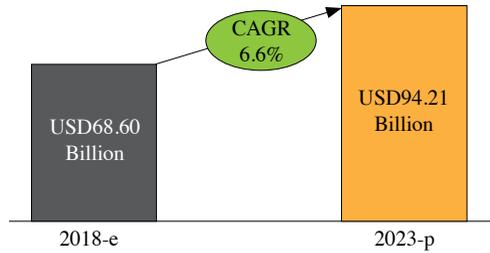


Figure 1. Functional food market ingredients, CAGR (%)

Source: <https://www.marketsandmarkets.com/Market-Reports/functional-food-ingredients-market-9242020.html>

Prebiotic fortified *kuini* juice

The National Agro-Food Policy (NAFP) (2011 – 2020) paves the way for promoting the fruit industry by exploiting the less-consumed and potentially unreliable fruits through (MARDI) (Noorlidawati 2018). The Malaysian Agricultural Research and Development Institute is responsible for developing new varieties and improving the existing species on non-primary germplasm and preserved fruit groups, as well as strengthening the use of the functional aspects of indigenous fruits through ethnobotany and biochemistry (MOA 2016). Besides, NAFP also emphasises on the local food production and increases efficiency of the agribusiness industry along the supply chain. According to the Department of Statistics, Malaysia recorded 32% increase in Malaysian value added agriculture in 2018 (RM109.1 million) from 2010 (Figure 2). In addition, the World Bank also revealed that Malaysia ranked 22nd in the world in 2018 (USP27.03) on value added agriculture.

In view of the potential health benefits offered by the indigenous fruits, MARDI has developed *kuini* juice fortified with prebiotics. It refers to a functional drink that uses the *kuini* pulp which has higher total soluble fibre and antioxidant content as the main ingredient together with the prebiotics. Many studies have also highlighted the vast potential of health benefits from consuming *kuini*. It is rich in vitamin A, C and fibre content (Iriani et al. 2019), and has superior

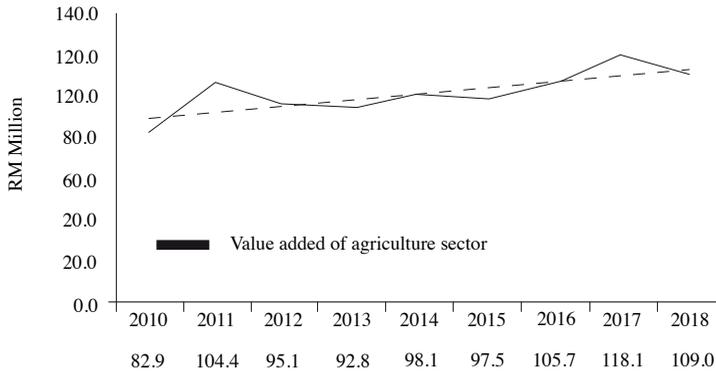


Figure 2. Value added agriculture sector in Malaysia 2010 – 2018 (RM Million)

Source: Agrofood (2018)

sweetness compared to the other commercial cultivars (Brooke and Lau 2011). Besides, it contains higher protein and calcium compared to other *Mangifera* species and has acceptable amounts of carotenoids (Khoo et al. 2008; Mirfat et al. 2015). Noorlidawati et al. (2017) found that indigenous fruits, such as *kuini*, are more likely to be functional products based on functional beverages due to their high content in vitamins. They also suggested a need for a consumer acceptance study to determine the consumer's preference towards the indigenous fruit prior to product launching.

Accordingly, this study was carried out to explore the sensory attributes which influenced the purchase intention towards the new food product developed by MARDI. Purchase intention is very important for a new food product developed. There are a number of literatures on the acceptance and purchase intention of functional food products based on sensory attributes (Mohamad et al. 2014). It measures the predicted or planned actions in the future, which is the likelihood of predisposition to turning beliefs and attitude toward a product into actions (Ajzen 2001; Chou et al. 2012; Laroche et al. 2001; Manaktola and Jauhari 2007).

This study is important and useful for providing insights on the consumers' preferred attributes and purchase intention

towards prebiotic fortified *kuini* juice. They are important for increasing the success rate of production, marketing and consumption of food (Mogendi et al. 2016). In a nutshell, food attributes should be highly regarded as an important assessment in understanding the consumer's evaluation towards purchasing a new food product.

Methodology

Data collection

A set of structured questionnaires was distributed to 100 respondents throughout the Klang Valley based on convenience sampling. The choice of sampling site was based on the recommendations by Kotler and Keller (2006) where the marketers have to identify three parts in sequence of phases to gain market access. Phase one is choosing the value which consists of customer segmentation, targeting and positioning. For example, in the case of a new food product development for the functional ingredient (e.g. prebiotics), this study was conducted at selected hypermarket/supermarket located in the Klang Valley where majority of consumers indicated high familiarity of the product. The juice sample was given to the respondents to evaluate and rate against each product attribute using four-point Likert scale. They were asked to indicate their purchase intention towards prebiotic fortified *kuini* juice if it was made available in the market.

Data analysis

The data were subsequently transferred to IBM-SPSS Version 23 for further analysis. First, descriptive analysis was performed to profile the respondent's background, consumers' preferred attributes, overall product acceptance and purchase intention. Chi-square analysis was performed to investigate any significant relationships between respondents' knowledge on functional ingredients (prebiotic), consumption of *kuini*, potential health benefits received and acceptance of the product attributes. Next, logistic regression was conducted to investigate any independent variables that contributed to the respondent's purchase intention. Chua (2014) suggested the following requirements prior to running logistic regression analysis;

1. The independent variables should be dichotomous (the variables are measured based on two responses, i.e. Yes [1] and No/Otherwise [0]);
2. Sample size - The minimum sample size for each variable was 10 (Hommer and Leandmeshow 2000). This study consisted of seven variables ($7 \times 10 = 70$) to ensure good fit for the logistic regression analysis;
3. Multi-collinearity - The value of the standard error (S.E.) should be in the range ± 2.0 as all the independent variables must not correlate with each other. The value of the S.E. in this study was within the recommended range. Therefore, no multi-collinearity was detected in this study.

Logistic regression analysis deals with the probabilities which are the likelihood that something will happen. Odds are the ratio of the probability that an event will occur divided by the probability that an event will not occur (George and Mallery 2020). Probabilities normally lie between 0 and 1 and the odds ratio can be greater than 1. The odds ratio reveals the size of the independent variables on the dependent variables as shown in *Table 1* (Chua 2014).

Table 1. Magnitude effects of odds ratio

The value of odds ratio	Magnitude effect	Effect size
<1.0	Lower the opportunity	Small
1.1 – 3.0	Increase the opportunity	Small
3.1 – 5.0	Increase the opportunity	Moderate
>5.0	Increase the opportunity	High

Source: Chua (2014)

It can be seen in the results and discussions section that the odds ratio is expressed as Exp (B). Besides, there is a construct known as a logit, a natural logarithm (*ln*) of the odds.

$$y (\text{purchase intention}) = \ln [\text{probabilities (yes)/probabilities (no)}]$$

$$= \beta_0 + \beta_1 (X_1) + \dots + \beta_n X_n$$

Where β_0 = Logistic regression constant and β_n = logistic coefficient of each *X*

Therefore, the logistic regression model can be presented as follows:

$$Y = \beta_0 + \beta_1 (\text{Taste}) + \beta_2 (\text{Colour}) + \beta_3 (\text{Appearance}) + \beta_4 (\text{Aroma}) + \beta_5 (\text{Viscosity}) + \beta_6 (\text{Overall acceptance})$$

This regression analysis used the Forward: LR method. IBM-SPSS builds the equation by entering variables one at a time, using likelihood ratio estimates to determine which variable will add the most to the regression model (George and Mallery 2020).

Results

Demographic characteristics of respondents

Table 2 summarises the demographic characteristics of the respondents. Based on *Table 2*, majority of the respondents were female. In addition, 41% of the respondents came from the age group of 31 – 40 years. Most of the respondents were Malays (88%) and majority of the respondents were certificate, diploma or degree (IPTA) holders, followed by those who completed up to secondary and primary education. Finally, the largest percentage of respondents earned between RM1,500 and RM2,000.

Table 2. Demographic profile of respondents (n = 100)

Profile	%
Age (years)	
20 and below	1.0
21 – 30	22.0
31 – 40	41.0
41 – 50	21.0
Above 50	15.0
Gender	
Male	37.0
Female	63.0
Ethnicity	
Malay	88.0
Chinese	10.0
Indian	2.0
Others	–
Education	
IPTA	66.0
Secondary school	32.0
Primary school	2.0
Others	1.0
Income group (RM/month)	
RM1,500 – RM2,000	44.0
RM2,001 – RM3,000	25.3
RM3,001 – RM 4,000	16.5
>RM4,001	14.3

Source: Survey (2019)

Consumption, knowledge on functional ingredients (prebiotic) and level of acceptance towards product attributes

Almost 83% of the respondents indicated to have past experience in consuming indigenous fruits. However, only 71.7% (Figure 3) have eaten this fruit in the form of *sambal kuini* (59.0%). *Sambal kuini* refers to a Malay condiment which is made of pounded fermented shrimp paste, chillies, kaffir lime leaves, *calamansi* lime and shallots. Meanwhile, 47% of the respondents consumed *kuini* as a juice. Chi-square analysis revealed statistically significant relationships between consumption and two socio-demographic variables *viz.*

1. ethnic ($X^2 = 22.299$, $df = 2$, $p < 0.005$) and
2. age ($X^2 = 11.536$, $df = 4$, $p < 0.005$).

Figure 4 shows the respondent's overall acceptance towards the prebiotic fortified *kuini* juice. The highest sensory attribute was taste (90%), followed by colour (89%), aroma (86%) and appearance (85%). The overall acceptance was 92%. In other words, the consumers can accept the product very well. Ethnic ($X^2 = 12.392$, $df = 4$, $p < 0.005$) and gender significantly influenced the overall acceptance of the *kuini* juice. However, viscosity indicated the lowest sensory attribute (59%). This sensory attribute necessitates improvement based on the consumer's preference.

In terms of health benefits of functional ingredients, almost 63% of the respondents knew about the prebiotics (Figure 5). Chi-square test revealed that there was a statistically significant association between the knowledge of prebiotics and the demographic factors i.e. level of education ($X^2 = 14.886$, $df = 2$, $p < 0.005$), age ($X^2 = 12.392$, $df = 4$, $p < 0.005$) and gender ($X^2 = 5.189$, $df = 1$, $p < 0.005$).

Respondent's purchase intention

This regression analysis used the Forward: LR method resulting in 2 models (Table 3) which included the significant independent variables that influenced the dependent variables and purchase intention.

Table 3 summarizes results from the logistic regression analysis. The study indicated that only overall acceptance explains the respondents' purchase intention [X^2 ($df = 1$, $N = 100$) = 19.437, $p < .05$] for Model 1 with 34% (R^2 Nagelkerke) of the dependent variables predicted by independent variables as depicted in Table 4. Meanwhile, Model 2 shows two significant independent variables i.e. taste and overall acceptance [X^2 ($df = 1$, $N = 100$) = 26.567, $p < 0.05$] with $R^2 = 44.9\%$.

The exact significant independent variables that influenced the probability of the respondent's purchase intention are presented in Table 5. The value of Wald [X^2 ($df = 1$, $N = 100$) = 13.26, $p < 0.05$] in Model 1 is significant for the independent

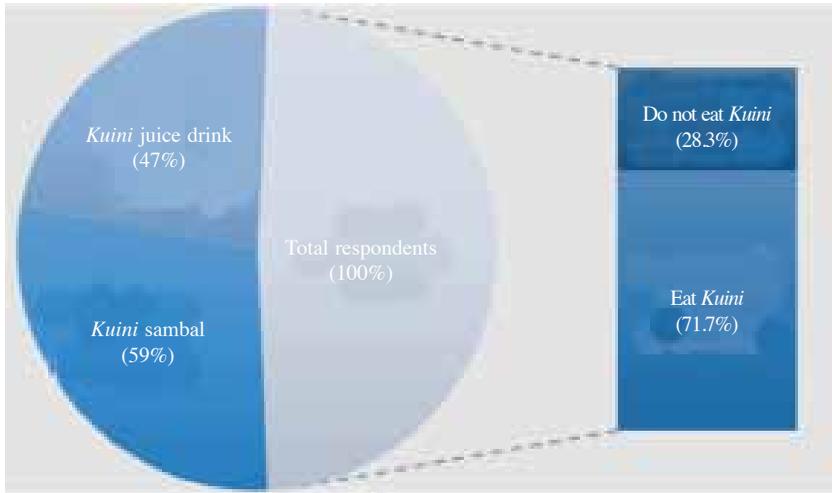


Figure 3. Types of kuini's by-product consumption (%)
Source: Survey (2019)

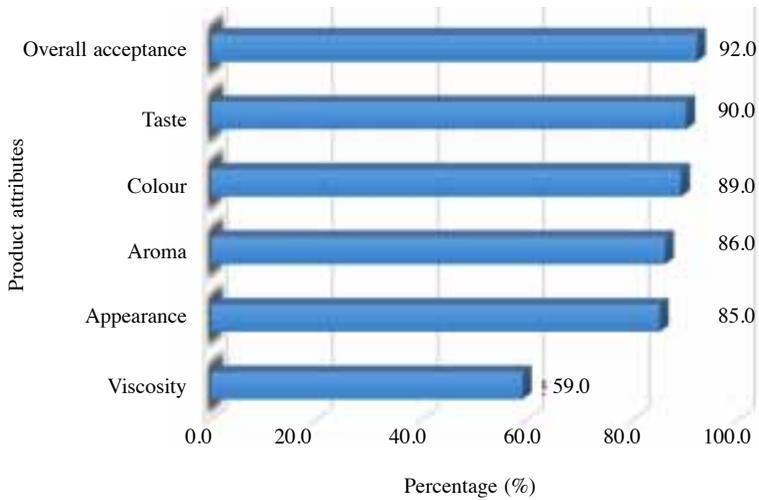


Figure 4. Consumers' acceptance towards product attributes (%)
Source: Survey (2019)

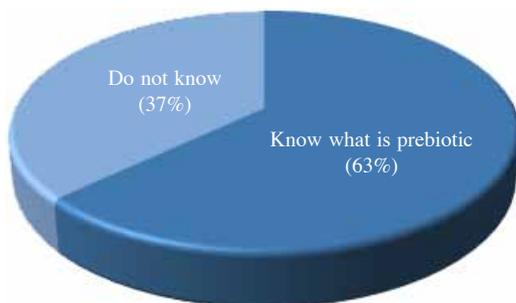


Figure 5. Consumers' knowledge towards functional ingredients, prebiotics (%)
Source: Survey (2019)

Table 3. Omnibus tests of model coefficients

		Chi-square	df	Sig.
Step 1	Step	19.437	1	.000
	Block	19.437	1	.000
	Model	19.437	1	.000
Step 2	Step	7.131	1	.000
	Block	26.567	2	.000
	Model	26.567	2	.000

Table 4. Model summary (R² = Nagelkerke)

Step	-2 Log likelihood	Cox & Snell R Square	Nagelkerke R Square
1	53.948 ^a	.177	.340
2	46.818 ^b	.233	.449

variable i.e. overall acceptance. Overall acceptance is the predictor variables for the purchase intention. The value of odd ratio in Model 1 Exp (B) = 15.448 can be interpreted as probability of the product being purchased is 15.4 times higher than that of not being purchased ($p < 0.05$) with every unit increase of overall acceptance based on the 4-point Likert scale. Meanwhile, Model 2 shows that the probability of respondents to purchase based on taste and overall acceptance are 6.7 and 9.6 times respectively, then that of not being purchased ($p < 0.05$) with every unit increase in taste and overall acceptance.

These two models indicated correct prediction rate of being purchased of 90% (Table 6). This implied that 90% of the respondents intended to purchase product 1 out of 100% respondents who indicated yes for both models.

Discussion

This study revealed that taste and overall acceptance (Model 2) were two independent variables that led to the respondent’s purchase intention. Taste plays an important role in product evaluation (Grunert and van Trijp 2014). According to Sowmya et

Table 5. Variables in the equation

Model	B	S.E	Wald	df	Sig.	Exp (B)
Model 1						
Overall acceptance	2.737	0.752	13.264	1	0.000	15.448
Constant	-6.135	2.138	8.232	1	0.004	0.002
Model 2						
Taste	1.911	.766	6.226	1	.013	6.757
Overall acceptance	2.266	.825	7.543	1	.006	9.640
Constant	-10.307	3.178	10.520	1	.001	.000

Table 6. Correct prediction rate of being purchased (%)

	Predicted (%) purchasing decision		
	Yes	No	Total
Kuini’s juice drink with prebiotic characteristics: Models 1 and 2			
Yes	85.0	3.0	88.0
No	7.0	5.0	12.0
Total	92.0	8.0	100.0
Correct prediction	90.0		
Incorrect prediction	10.0		

al. (2019), taste of all the *Garcinia indica* (*Kokum*) products were very much liked by the respondents. In addition, Anderson et al. (2019) found that consumers primarily pay attention to liking of taste and least attention to liking of odour or aroma. However, limited research has been conducted with regards to indigenous fruits. Some of the indigenous fruits are exploited by the non-foods, such as essential oils which use *Mānuka*, (*Leptospermum scoparium*) and *Kānuka* (*Kunzea ericoides*), the two native tea tree species found widely in New Zealand (Essien et al. 2019).

Apart from sensory attributes, this study also showed statistically significant associations between some socio-demographic characteristics (ethnic, age, level of education and gender) and several variables of the study such as knowledge of the functional ingredients (prebiotic),

consumption of indigenous fruits and sensory attributes of the product. Various studies have also highlighted the important roles of socio-demographic variables in influencing purchase intentions as it shapes effective marketing communication strategies for the innovative products (Hung et al. 2016) as well as impacts the marketing strategy for a new product development.

In response to the NAFP (2011 – 2020), MARDI initiated to conserve genes in the field, especially for the indigenous fruits for genetic resources (Noorlidawati et al. 2018). Currently, there are about 168 species of indigenous, rare and wild tropical fruit species consisting about 2,000 accessions being conserved, which is the largest in the country (Nordin 2015). These efforts are vital as it ensures sustainability of natural resources for future generations and conservation. Good conservation management will result in sustainability of existing genetic resources as well as recognise the value and potential of these indigenous fruits.

Conclusion and recommendations

This study found taste and overall acceptance as the most important sensory attributes leading to higher probability of consumer's purchase intention. These attributes should be considered as product strength or 'selling point' when the product is ready for commercialisation. This study also found significant associations between ethnic, age, education and gender, and the knowledge of consumers' purchase intention, consumption of indigenous fruits and level of acceptance towards the prebiotic-fortified *kuini* juice. These socio-demographic factors should also be considered in formulating marketing and promotional strategies. Further research should be conducted to understand the consumers' sensory evaluation and purchase intention throughout Malaysia prior to product launching.

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Abstrak

Kajian awal ini bertujuan untuk meneroka ciri produk yang mempengaruhi niat untuk membeli dalam kalangan pengguna terhadap produk berasaskan buah-buahan nadir di Malaysia, iaitu buah *kuini* yang dibangunkan oleh MARDI. Survei telah dijalankan berdasarkan pensampelan mudah melibatkan 100 responden di Lembah Klang dengan menggunakan borang soal selidik berstruktur. Antara ciri yang dinilai ialah rasa, warna, rupa, aroma, kelikatan dan penerimaan keseluruhan. Kajian mendapati terdapat hubungan yang signifikan antara faktor demografi (etnik, umur, pendidikan dan jantina) dengan pengetahuan responden mengenai prebiotik, penggunaan buah nadir dan *kuini* serta manfaat kesihatan yang diperoleh. Kajian ini penting dalam memberi input kepada para penyelidik dan usahawan yang berpotensi mengenai ciri yang digemari pengguna serta niat untuk membeli sebagai panduan kepada pembangunan produk dan strategi pemasaran yang efektif sekiranya produk dikomersialkan kelak.