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## The Assessment of Customer Behavior, Intention and Preference of Bamboo Shoot-Processed Food from Small and Medium Enterprises Products, Prachinburi, Thailand

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### ABSTRACT

Bamboo shoots are a well-known dish in Thailand, particularly the Tong Sriprachin variety, produced by small businesses in Prachinburi, a region known for its commercial potential. However, there is an opportunity to enhance this product and sell it for different market segmentation. This study explores consumer behavior, intentions and preferences of local products using a mixed methods approach. Qualitative focus group discussions with actors in the bamboo food supply chains revealed 25 marketing mix items, which were further analysed using an online consumer survey. Multivariate analyses highlighted the key factors. The logistic regression showed significant overall acceptance ( $P \leq 0.05$ ) for boiled and pickled bamboo shoots, which are the original products. Meanwhile, preserved bamboo shoots, kimchi bamboo shoots and bamboo shoot soup also received significant acceptance ( $P \leq 0.05$ ) based on their colour and appearance. This suggests a growing awareness of food attributes in new products, which results in the purchase probability. Principal Component Analysis (PCA) mapping revealed that factors

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such as deliciousness, safety and convince significantly influence purchase intentions. Price remains the primary concern for original products, but nutrition and food standards also impact purchasing decisions for new products. Consumer preference quantitative assessments indicated that original products scored higher in sensory evaluations than new products. Colour, flavour, and texture in new product development must align with intentions and also market segments. Entrepreneurs are encouraged to optimize pricing and management and utilize appropriate technology to enhance competitiveness based on local resources and innovative products.

**Keywords:** Bamboo Shoot; Consumer Survey; Focus Group Discussion; Local Enterprise; Multivariate analysis; Principal Component Analysis; Sensory Evaluation

## 1. Introduction

Many studies explore consumer insights by connecting food preferences with successful marketing strategies, examining customer behavior to identify ways to achieve business success. Food authors must pay close attention to the subtle cues of their customers' needs and reactions, especially in a setting where customer satisfaction is crucial. This perception has been put into practice in various observations.

### 1.1. The Attitudes and Behaviours

Food procurement involves various challenges, such as availability, pricing, preparation difficulty and logistical problems. The Alphabet Theory incorporates the Value-Belief-Norm (VBN) Theory, which explores how people gain knowledge, seek information and form habitual behaviours while considering the impact of demographic factors on consumer choices. This theory is illustrated by a diagram highlighting the connections between consumer attitudes, actions and the interaction between their environments and behaviours. Individuals actively seeking information will likely develop strong opinions, leading to important decisions and lasting habits. In contrast, those who approach shopping as a routine may overlook product details, resulting in differing attitudes and behaviours from those who make more intentional choices. External influences can greatly affect individuals' feelings and beliefs, strengthening or weakening them and shaping how they seek information and learn. Additionally, demographic factors such as age and education significantly influence how people search for information and gain knowledge,

impacting their attitudes and interactions with their surroundings<sup>[1]</sup>. This theory explores how individual values, beliefs, and norms influence attitudes and behaviours. It highlights how demographic factors such as age, education, and cultural background shape consumer decisions. The VBN theory explains why consumers prioritize environmental sustainability and food safety when purchasing bamboo shoot products. Research shows that developing cooking skills and grocery shopping can significantly change individuals' attitudes and behaviours toward food purchasing<sup>[2]</sup>.

The Alphabet Theory enhances our comprehension of the decision-making processes related to food purchases. However, a person's preference for a certain food or perception of its quality only sometimes leads to an actual purchase. Researchers conduct in-depth studies exploring consumer views on product characteristics to uncover consumers' preferences and willingness to invest in various food options. While some people may wish to buy local food due to its perceived value, their purchasing choices may not consistently align with these intentions when given the chance. Additionally, researchers have analyzed how demographic factors influence consumer attitudes and buying behaviors to understand better the impact of personal traits on these attitudes and actions<sup>[3]</sup>. Results show that consumers who are more knowledgeable about meat products pay special attention to their origins when purchasing<sup>[4]</sup>.

As the supply of a purchased product contracts, consumers are generally more inclined to pay a higher price. Therefore, it is crucial to consider different consumption levels when assessing consumers' willingness to invest in premium items like locally sourced products<sup>[5]</sup>. The Value-Belief-Norm (VBN) Theory is a key

framework for understanding how values, beliefs, and norms influence consumer attitudes. These elements significantly impact how consumers perceive various food types, guiding their purchasing choices or decisions to avoid certain products. Extensive research has explored the attitudes related to choosing local food. Consumers often cite several reasons for preferring local products, including perceived higher quality typically associated with freshness and concerns about personal health, food safety, environmental sustainability, and a desire to support local businesses<sup>[6]</sup>. Many consumers believe local food offers superior quality due to its freshness, health advantages and nutritional benefits<sup>[7]</sup>.

### 1.2. The Intention of Consumers and Preferences

The concept of intention in consumer behavior pertains to the probability that an individual will purchase a specific product or service<sup>[6]</sup>. This concept summarizes the consumer's intended purchasing decisions, displayed by their attitudes, emotional responses, perceived value, and an array of external influences. It is essential to recognize the difference between purchase intention and ordinary need; the former indicates the consumer's readiness to allocate financial resources for a product. This distinction is widely acknowledged as a valid predictor of buying behavior<sup>[8, 9]</sup>. Furthermore, when consumers' perceptions of a product correspond with their expectations, their purchase intention is significantly enhanced<sup>[10]</sup>.

A growing number of consumers focus on local food, including products that have travelled short distances or are sold directly by their producers. This trend is driven by increased consumer interest and government efforts to bolster local economies<sup>[11]</sup>. Preferences for original food products are important to all parties involved in the food supply chain, including producers, businesses, and policymakers. These preferences are influenced by various factors such as health concerns, personal experiences, cultural traditions, and considerations of environmental and economic impacts. There has been a significant rise in the consumption of traditional food products, primarily due to consumers becoming more aware of health and food quality. Additionally,

there is a growing interest in locally sourced products valued for their distinct characteristics, authenticity, and high standards linked to traditional production methods, as well as a commitment to environmental sustainability and the economic growth of local and rural areas<sup>[12, 13]</sup>.

### 1.3. The Research Analysis of Customer

There are various methods to study consumer behaviour and analysis. Qualitative research focuses on detailed interviews and focus groups to understand how consumers perceive and make food purchasing decisions<sup>[14]</sup>. On the other hand, quantitative approaches, like blind sensory tests and Vickrey auctions, assess how different product labels with unique and appealing characteristics impact consumer choices<sup>[15]</sup>. Furthermore, A mixed methods, combining focus groups with an online survey that includes a factorial survey, is essential for exploring the importance of geographic origin in label buying and understanding the benefits of food production. Due to the multitude of influences on customers actual purchase behaviour<sup>[16]</sup>.

Additionally, multivariate analysis involves various statistical methods that look at three or more related variables at the same time to understand how they interact with each other<sup>[17]</sup>. This is an alternative method to analyse the consumer actions<sup>[18]</sup>. One of these methods is Logistic Regression Analysis (LRA), which helps estimate the likelihood of a specific event happening based on multiple factors. For example, when evaluating how consumers accept a product, people can be divided into those who accept or reject it, or the likelihood of this acceptance can be measured. Another method, Factor Analysis (FA), groups variables into different factors based on their relationships, simplifying the analysis by reducing the number of variables. Principal Component Analysis (PCA) identifies the main factors affecting consumer demand, with results typically shown through component scores and loadings<sup>[19, 20]</sup>. Previous research has highlighted that sensory element, especially colour, significantly shape consumer preferences and purchasing decisions<sup>[20]</sup>. Consumer acceptance of bamboo products, for instance, can vary greatly and is affected by sensory appears like colour, texture, and flavour<sup>[21]</sup>. This methodological approach enriches

the understanding of the diverse factors that shape consumer<sup>[22, 23]</sup>.

#### 1.4. Bamboo and Small and Medium-Sized Entrepreneurs in Thailand

Bamboo is a well-known tall grass type that mostly grows in tropical regions<sup>[24]</sup>. Thailand, located in South-east Asia, has a wide variety of bamboo species, with around 60 types spread across 13 genera. Bamboo covers about 5.5% of the country's forests, almost 5,000,000 rai. One of the most commonly grown types is *Dendrocalamus asper* Backer, also called Tong bamboo or sweet bamboo, which is very important for the bamboo industry<sup>[25]</sup>. In 2019, Thailand had 84,859 bamboo plantations, with about 40% of them located in Prachinburi Province. Tong Sriprachin is a type of bamboo found especially in the Prachinburi region. Local businesses produce bamboo shoot products sold in markets throughout Thailand, including Bangkok, Pathum Thani, and the central territory. These bamboo shoots are known for their delicious taste and satisfying crunch. They can be cooked in several ways, like boiling or steaming, and can be preserved by pickling. Additionally, the pickled of bamboo shoots exemplifies the diverse culinary applications of this resource, showcasing how different cooking techniques yield various marketable products<sup>[26]</sup>. Recent studies from 2023–2024 have highlighted bamboo shoots as an undervalued yet highly sustainable food source. For example, the research of Zhang<sup>[27]</sup> emphasized the nutritional and functional benefits, which could position them as a globally relevant food product. Rai<sup>[28]</sup> noted that consumer interest in sustainable and health-conscious food products continues to grow, aligning with the increasing demand for innovative yet traditional food products like bamboo shoots. However, there is an opportunity to enhance this product and produce to different market segments.

Small and Medium-sized Entrepreneurs (SMEs) comprise 99% of all companies in Thailand. The micro and small businesses often need more funding, financial resources, and marketing opportunities than larger companies. One solution is to develop innovative idea, high-quality products that meet consumer needs<sup>[29]</sup>. However, consumers react to these products can significantly

influence their acceptance. Various factors, such as demographics, education, income, and environmental concerns, play a role in this response. Additionally, the features of a product, including personal preferences, nutritional value, origin, safety, and convenience, are important when making a purchase<sup>[30, 31]</sup>. Consequently, Local business owners should create products and services that meet customer requirements<sup>[32, 33]</sup>. By doing this, we can learn more about how customers decide what to buy using statistical techniques. What customers think about products plays a deep character in their purchasing behaviours. These aspects also emphasize how important a product's value is, especially when looking at its quality and quantity<sup>[34]</sup>.

However, there needs to be more data on the factors concerning consumers for bamboo shoot-processed food, particularly in regions identical to Prachinburi, a major bamboo production area in Thailand. The present study assesses consumer behavior, intention and preference by mixed approaches regarding food products. The paper is structured using mixed methods. Firstly, the research started with a qualitative focus group discussion exploring the bamboo business of Prachinburi enterprises. This was followed by analyzing marketing mix factors through consumer sampling using multivariate methods. Finally, consumer preferences were determined through sensory evaluations in quantitative studies. The results offer producers valuable insights into consumer responses, helping them improve their products and business strategies to address consumer needs and close the information gap concerning local products.

## 2. Materials and Methods

### 2.1. Study of Factors Affecting the Decision to Purchase Bamboo Shoot Products

Qualitative focus group investigated the intention factors for purchasing bamboo shoot products. Entrepreneurs examined a study of focus group interviews, including 24 persons in food supply chains of bamboo product as manufacturers, retailers and sellers in three districts of Prachinburi Province (14.109919, 101.329640; Google map), Thailand consisting of Muang, Prachantakham and Nadi was used. This method

was an initial step of mixed methods approach to explore consumer perceptions, identify key factors influencing purchasing decisions and understand the context of bamboo shoot product consumption. An interview guideline was developed to cover all relevant aspects of the marketing mix (product, price, place and promotion). The answers to the factors were collected to design the questionnaire to evaluate the consumption behavior of bamboo shoot products.

## 2.2. Study of Consumption Behavior of Bamboo Shoot Products

The study of consumer intention is associated with various bamboo shoot products. To achieve this, insights factors from section 2.1 were enabled in the questionnaires. Furthermore, the ethical code RMUTT\_REC No.82/66 was approved for 2.2 and 2.3 section before testing. A purposive sampling was employed to identify individual testers who regularly consumed bamboo shoot products and were available for participation. The selected demographic comprised individuals aged 18 to 60, in good health, residing in Bangkok, Pathum Thani and Ayutthaya provinces. There were 300 respondents to the survey launched in a shopping mall by filling in a Google form survey. In this survey, participants were asked to express their overall views on the market's products, including product, price, place and promotion. Their attitudes were assessed using a five-point Likert scale, with response options ranging from 5 (strongly agree) to 1 (strongly disagree)<sup>[35]</sup>. This phase aimed to validate and generalize the qualitative findings across a broader demographic, ensuring statistical reliability. The collected data have analysed the statistics comprehensively for demographic and consumer behaviours. After examining consumer characteristics, culinary applications for bamboo shoots and product attributes were evaluated. The result was reported in percentages and factors influencing decisions were analysed using multivariate analysis, including LRA, FC and PCA by SPSS 17.0 software (SPSS Inc., IL, USA). Statistical significance ( $P \leq 0.05$ ) was detected. The analysis results were used to develop the prediction modelling of intention. By combining these approaches, the study ensured that the exploratory depth of qualitative methods complemented

the generalizability of quantitative data, providing robust and actionable insights into consumer behaviour.

The study employed multivariate analysis techniques, to comprehensively analyse consumer behaviour. FA was used to group the 25 marketing mix items into smaller, meaningful factors, simplifying the dataset for interpretation. PCA further reduced the dimensionality of the data by identifying key components that explained the most variance, ensuring the retention of critical information. LRA was applied to model the probability of purchase decisions based on attributes such as colour, appearance and overall acceptance, providing actionable insights through odds ratios and significance levels. Together, these techniques offered both structural clarity and predictive accuracy, enabling a robust evaluation of factors influencing consumer purchasing decisions.

The study employed a Logistic Regression Model to examine the relationship between independent variables and customer responses. The methodological approach enabled a quantitative assessment of how independent variables affect the customer of intention, utilizing a significance level of  $P \leq 0.05$ . The specific equation utilized in this analysis is delineated in Equation 1. Since the chances is expressed as a ratio, the model will focus on the logarithm of this ratio, with  $\pi$  representing the event's probability and  $\beta_i$  denoting the regression coefficients related to the reference group and the  $x_i$  explanatory variables<sup>[36, 37]</sup>.

$$cY = \beta_0 + \beta_1x_1 + \beta_2x_2 + \dots + \beta_mx_m \quad (1)$$

Interpretation of odds ratio, Odds Ratio (OR) is a metric in binary logistic regression that measures the relationship between independent variables and the probability of an event in the dependent. The OR value reflects the impact of changes in independent variables on the probability of the event, with the  $\text{Exp}(B)$  value of the beta coefficient depicting the strength of the relationship. The formula for this is presented in Equation 2<sup>[38]</sup>. Where  $\beta$  = Logistic regression coefficient obtained from the regression model.

$$OR = \frac{e^B}{1 + e^B} \quad (2)$$

The initial agreement was assessed using factor analysis, which included calculating certain index values.

The Kaiser-Meyer-Olkin Measure of Sampling Adequacy (KMO) was used to determine if factor analysis was suitable for the data, with a KMO score of 0.5 or higher indicating that it was appropriate. After that, Bartlett's Test of sphericity was performed to test statistical hypotheses. If the result was below 0.05, it indicated a significant connection among the variables, supporting factor analysis<sup>[39]</sup>. Factor analysis is a method used to organize many variables into smaller groups, called factors. Variables within the same factor are closely related, either moving in the same direction or in opposite directions. In contrast, variables in different factors are either unrelated or only slightly related. This process allows many variables to be simplified into groups. Each new factor is created as a combination of the original variables<sup>[40]</sup>.

### 2.3. Study of Sensory Evaluation of Bamboo Shoot Products

After consumption behaviour assessment, sensory evaluation of culinary bamboo shoot-processed products was tested using consumer preference (100 panelists, of which 45 were males and 55 were females). The sample items were sampling from local entrepreneurs. Samples preparations were presented with a three-digit random number and random presentation order. Allergic information was given before testing. The products attributes of colour, flavour, texture, and overall acceptance were investigated using a hedonic scoring 9-point scale (1 = dislike extremely, 5 = neither like nor dislike, 9 = like extremely)<sup>[41]</sup>. The SPSS 17.0 software (SPSS Inc., IL, USA) was employed an analysis for mean variations and percentage of purchase intention.

## 3. Results and Discussion

### 3.1. Factors Affecting on Decision of Bamboo Shoot Products

According to the results of the interviews with 24 business owners regarding the bamboo supply chains in Prachinburi, the colour and appearance of bamboo shoot products exhibited a big impact on consumer preference. When choosing a product, a visually appealing colour can catch a consumer's eye. Additionally, a previ-

ous study revealed that colour is a crucial factor that affects consumers' perception of freshness and good quality<sup>[20]</sup>.

During the group discussion, results reached a consensus to procure 25 items. Employing the marketing mix framework as our reference (**Table 1**), the classified items were as follows: 13 were designated for the product category, 3 for price, 6 for place, and 2 for promotion. After that, all items were collected to design the questionnaire to evaluate the consumption behavior of bamboo shoot products. The previous research indicated that consumers focused on features including colour, texture and packaging, and connected these characteristics to their perceptions of a product's quality. Customers were willing to spend more on new or higher-quality items, especially if products included convincing promotional materials. Furthermore, customers were more likely to purchase products that were located in areas that were convenient for them. These insights are essential for developing business strategies that enhance convenience, optimize costs, and improve product features in order to stand out as a business in the competitive landscape. The results from table 1 showed that customers pay attention to the colour, texture, taste and packaging of product categories because these features are related to quality. While people care about prices, especially for familiar products, many are still willing to pay a set amount when making choices. Additionally, the locations where people shop, such as markets and supermarkets, play a role in their buying choices. However, promotions affect their intentions when they compare another product. Understanding these factors is essential for entrepreneurs to concentrate on improving standards of product quality, effectively adjusting prices, and simplifying the purchasing process in order to help them achieve superiority. The study of participants associated sustainable food with a variety of concepts that have been categorized into 11 themes based on eating behaviour related to several factors, including those related to the characteristics of food and food production, environmental impact local and organic, animal-based vs. plant-based, healthy and nutritious, ethically produced, production, and agriculture<sup>[42]</sup>. According to

a previous study's focus group discussion with 10 customers, perceived quality, brand awareness, brand associations, and brand trust all had an impact on brand equity, whereas brand loyalty was mostly driven by brand awareness and brand trust. Additionally, advertising also played an important role in influencing brand awareness, brand associations, perceived quality, and brand trust<sup>[43]</sup>.

**Table 1.** Factors affecting the decision to intent processed bamboo shoot products by a focus group discussion.

Marketing Mix *			
Product	Price	Place	Promotion
appearance	price	clean	gift
brand	price fix	convenient	package
colour		easy to buy	sale
easy to consume		seller	
good package		sex	
ingredients		show pricing	
law guarantee		safe to buy	
long keep			
nutrition			
odor			
quality fix			
shape			
taste			

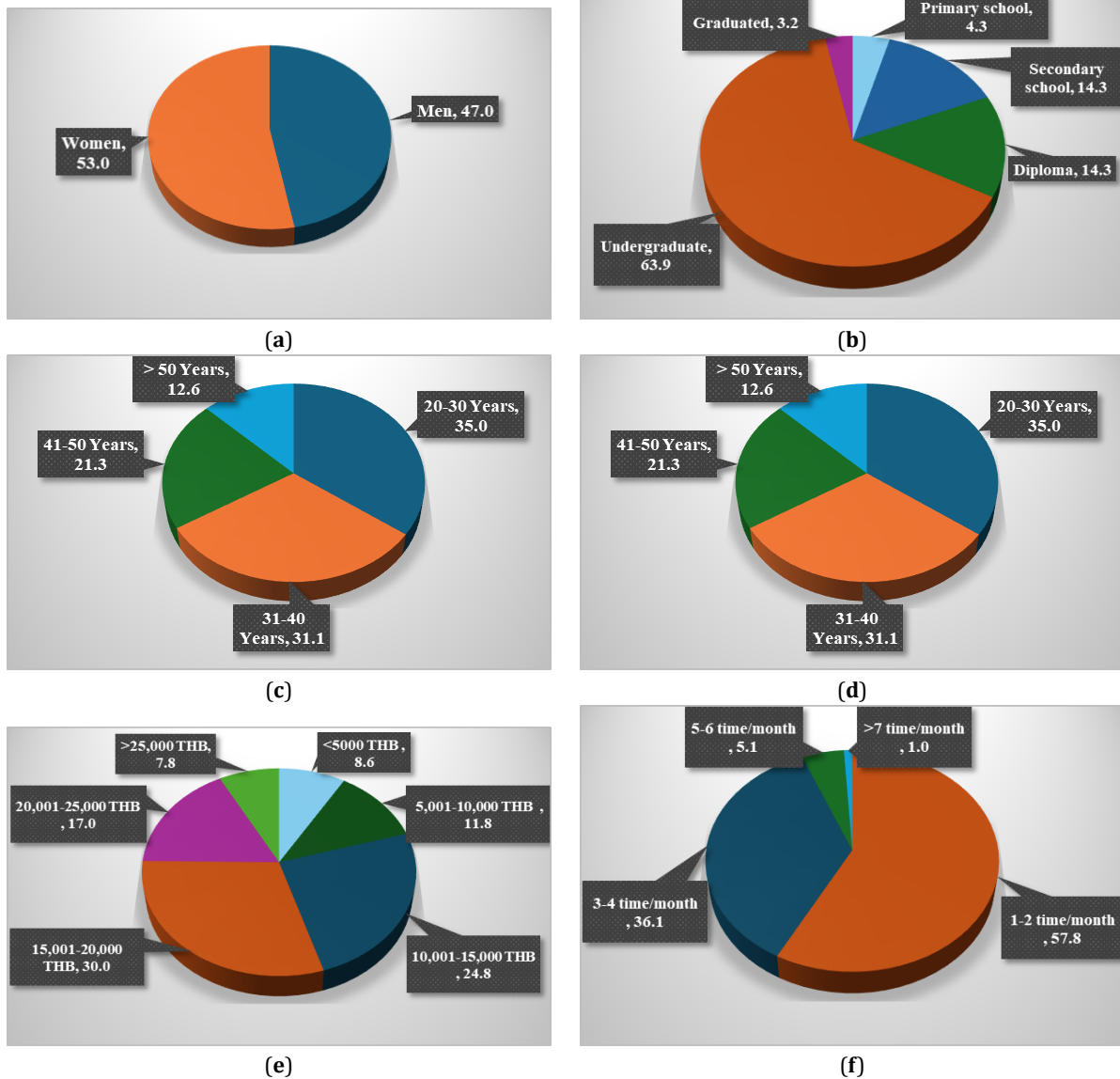
\* The table is arranged alphabetically.

### 3.2. Consumption Behaviour for Bamboo Shoot Products

The demographic information of 300 respondents showed that 47% of participants were male and 53% were female. The detailed demographic information of participants in this study is shown in **Figure 1**. Thirty-five percent of participants were in the 20–30 age group, and thirty-one percent were in the 31–40 age range. Furthermore, the majority of participants were undergraduate students (63.9%) and normally consumed bamboo shoot products 1–2 times a month (57.8%).

The study of consumer behavior showed that bamboo shoots can be used in a wide range of culinary preparations, such as stir-frying, curry, soup and fermented foods (**Table 2**). The top three recipes that Thai consumers typically used bamboo shoots in are bamboo shoot soup (20.1%), boiled bamboo shoots with pork bones (19.1%), and pickled bamboo shoots with curry chicken (18.5%). This finding is consistent with a study by Prukpa<sup>[44]</sup>, who found that bamboo shoots are a common vegetable used by Thai consumers in Thai cook-

ing, especially in soups and curries. The extensive usage of bamboo shoots in Thai cuisine, both original and modern items, is due to their deliciousness as well as their nutritional value. According to Zhang<sup>[27]</sup>, bamboo shoots have a low starch and fat content and are an excellent source of protein and dietary fiber. These nutritional properties make bamboo shoots more appealing to health-conscious consumers. A number of studies have also indicated that bamboo shoots are a staple diet in Asia and represent a sustainable and nutritious food choice<sup>[27, 45, 46]</sup>. As a result, eating bamboo shoots dishes is not only culturally significant but also health-promoting in Thai and Asian communities. According to bamboo dishes reported in **Table 2**, five products were then developed by local entrepreneurs and given to panelists for evaluation: boiled bamboo shoots, pickled bamboo shoots, preserved bamboo shoots, bamboo shoot kimchi and bamboo shoot soup. Bamboo shoot curry, stir-fried bamboo shoots with eggs and stir-fried bamboo shoots with basil were not included because they were intended for ready-to-eat recipes.



**Figure 1.** Thai consumer characteristics reported in percentage: (a) gender, (b) education level, (c) age, (d) occupation, (e) income salary and (f) frequency of bamboo consumption.

The multivariate statistical method was used to develop a framework for making intentions about processed bamboo shoots. The findings in **Table 3** showed that factors like colour, appearance and overall acceptance significantly influence factors ( $P \leq 0.05$ ), with differences noted among various products. According to the logistic regression analysis, a higher overall acceptance rating decreases the probability of purchasing all products except preserved bamboo shoots. Specifically, pickled bamboo shoot and boiled bamboo shoots had a chance of making a correct prediction of 74.9 to 78.6, respectively. For each point increase in overall acceptance,

the chances of buying these products drop by about 0.48, 1.00, 0.77, and 1.09 times, respectively. Additionally, colour negatively affects purchasing decisions for preserved bamboo shoot and kimchi bamboo shoots, while appearance positively affects buying decisions for kimchi bamboo shoots ( $P \leq 0.05$ ).

$$Y = 1.99 - 0.16(\text{colour}) + 0.24(\text{appearance}) - 0.48(\text{overall acceptance})^* \quad (3)$$

For example, the logistic regression equation (3) suggests that overall acceptance negatively influences



purchasing decisions of boiled bamboo shoot ( $P \leq 0.05$ ). In addition, colour also negatively effects and appearance positively effects based on boiled bamboo shoot intention.

**Table 2.** Culinary bamboo shoot dishes\* item of a consumer survey.

Recipe Category	Culinary Dishes	Percentage ** (%)
Soup	Bamboo shoot soup	20.1
	Boiled bamboo shoot with pork bones	19.1
Curry	Pickled bamboo shoots with curry chicken	18.5
Stir-frying	Stir-fried with eggs	17.0
	Stir-fried with basil	12.0
Fermenting	Preserved bamboo shoots	7.8
	Kimchi	5.5

\* Source: Own elaboration.

\*\* Percentage in the same column.

**Table 3.** Logistic regression equations of processed bamboo shoot products.

Processed Products	Constant	Colour	Appearance	Overall Acceptance	Probability (%)
Boiled bamboo shoot	1.99	-0.16	+0.24	-0.48*	74.9
Pickled bamboo shoot	2.70	-0.06	+0.55	-1.00*	78.6
Preserved bamboo shoot	4.12	-0.32*	+0.27	-0.54	70.0
Kimchi bamboo shoot	4.67	-1.25*	+1.28*	-0.77*	76.2
Bamboo shoot soup	4.76	+0.58*	-0.28	-1.09*	76.2

\* Statistically significant in the same row ( $P \leq 0.05$ ).

When investigating the important factors (with a statistically significant of  $P \leq 0.05$ ) listed in **Table 4**, it can evaluate different processed bamboo shoot products. For boiled bamboo shoots, it was found that overall acceptance plays a significant role in the decision to purchase ( $P \leq 0.05$ ), with Exp(B) an odds ratio of 0.621. This means that if the score on a scale increase by 1 unit, the likelihood of purchasing increases by 0.621 times. Furthermore, the model prediction shows that overall acceptance positively influences purchasing decisions, The results had positive effect on pickled bamboo shoot and bamboo shoot soup at the same time. While as, Kimchi bamboo shoot had appearance attributes provided a significant role ( $P \leq 0.05$ ). Additionally, for preserved bamboo shoots, colour is another significant factor affecting purchasing decisions ( $P \leq 0.05$ ), with an odds ratio of 0.725, indicating that a 1 unit increase in the intention score leads to 0.725 times increase in the likelihood of interested the product. Therefore, improving the colour of the products should be a priority corresponding with kimchi bamboo shoot and bamboo shoot soup. The studies shown the five significant variables were tested by logistic regression. The probabilities of

the food marketing instance being child appealing, given its text and logos were significant. An increment of 1 % on text and logo probabilities increased the odds of a child finding a food marketing instance appealing by 2 % and 1 %<sup>[47]</sup>. In addition, Food insecurity, energy intake, protein intake, carbohydrate intake, being underweight, and a mother’s nutritional knowledge significantly affect the chances of toddlers’ stunted growth. The findings indicated that being underweight was the biggest factor contributing to stunting, an odds ratio of 18.572. The means underweight toddlers are 18.572 times more likely to be stunted in their growth<sup>[48]</sup>.

Factors affecting the decision to purchase processed bamboo shoot products from the sample group of consumers that are important are price, followed by nutrition, colour, taste, food standards and packaging, respectively (**Table 5**). It can be observed that if considering the product, there are 2 groups using data from Table 2, made by entrepreneurs. The first group is the original product group currently available for sale, including boiled and pickled bamboo shoots. Most consumers are concerned about price<sup>[49]</sup>, which may be products they have previously used, such as boiled bamboo shoots.

Moreover, it is easy to compare quality. Meanwhile, the new product group developed includes preserved bamboo shoots, kimchi bamboo shoots, and bamboo shoot soup. Consumers give importance to nutrition and standards. Consumers may be concerned about safety or food standard because it is new or need more information about the product. While as, the consumers consider colour, taste, income, brand and price factors in selecting wines. Furthermore, the product attributes, such as colour, taste and packaging, significantly influenced consumers' preference for purchasing locally produced

wines<sup>[50]</sup>. Consumer perception is a combination of sensory properties, personal and environmental factors. Sensory and personal factors include consumer age, attitude, health condition, nutrition awareness, and religion which directly influence consumer choice. Whereas environmental factors consist of regional variation in the food process, national economic status and consumer purchasing power. All these factors affect consumers' decisions to accept or reject foods. Additionally, consumers are more willing to taste innovative food products that assure the safety and quality of the product<sup>[28]</sup>.

**Table 4.** Exp(B) values from logistic regression equations of processed bamboo shoot products.

Attributes	Exp(B) of Processed Products				
	Boiled Bamboo Shoot	Pickled Bamboo Shoot	Preserved Bamboo Shoot	Kimchi Bamboo Shoot	Bamboo Shoot Soup
Colour	0.854	0.943	0.725*	0.286*	1.792*
Appearance	1.269	1.727	1.308	3.584*	0.759
Overall acceptance	0.621*	0.366*	0.582	0.462*	0.338*
Constant	5.054	14.787	61.235	105.821	116.590

\* Statistically significant in the same row ( $P \leq 0.05$ ).

**Table 5.** Factor affecting of purchasing intention of a consumer survey.

Category	Processed Products	Factor of Purchasing Intention * (%)					
		Price	Nutrition	Colour	Taste	Food Standard	Packaging
Original	Boiled bamboo shoot	52.6	20.0	9.1	9.6	8.3	0.4
	Pickled bamboo shoot	36.6	22.3	14.3	14.7	10.3	1.8
Modern	Preserved bamboo shoot	23.7	35.7	16.1	9.8	12.9	1.8
	Kimchi bamboo shoot	19.6	31.7	19.6	10.3	14.3	4.5
	Bamboo shoot soup	28.6	28.6	12.9	11.2	15.6	3.1

\* Percentage in the same row.

Using factor analysis and principal component analysis, the 25 factors from **Table 1** based on the reviews were used to collect data. After analyzing the results of factor analysis found that the KMO value = 0.83, which is greater than 0.5, indicating that the investigation using this technique is appropriate and assuming the Bartlett test indicates that all variables are related, which can be explained using factor analysis. Furthermore, the principal component analysis (PCA), as shown in **Figure 2**. The screen plot provided contained 8 groups of factors, which were identified by drawing a red line at eigenvalue 1 on the axis and observing its intersection with the component number axis. These factors can be grouped into new group factors (in red cycle) that consumers consider when purchasing processed bamboo shoot products, which were reduced by 25 factors to 8 factors. Ro-

tating the axis according to this method allows for re-grouping. Consumers attach importance to identifying which one, and a new name group were provided for individuals. Additionally, showing the factors within each group as follows:

- Group 1 (Safety factor) = safe to buy, clean
- Group 2 (Delicious factor) = nutrition, taste, ingredients
- Group 3 (Fleshly factor) = long keep, odor, convenience
- Group 4 (Visual factor) = colour, brand, shape, price
- Group 5 (Selection factor) = easy to consume, package, gift, sale
- Group 6 (Convenient factor) = seller, law guarantee

Group 7 (Selling factor) = quality fix, show pricing, price fix, sex

Group 8 (Convince factor) = appearance, good package, easy to buy

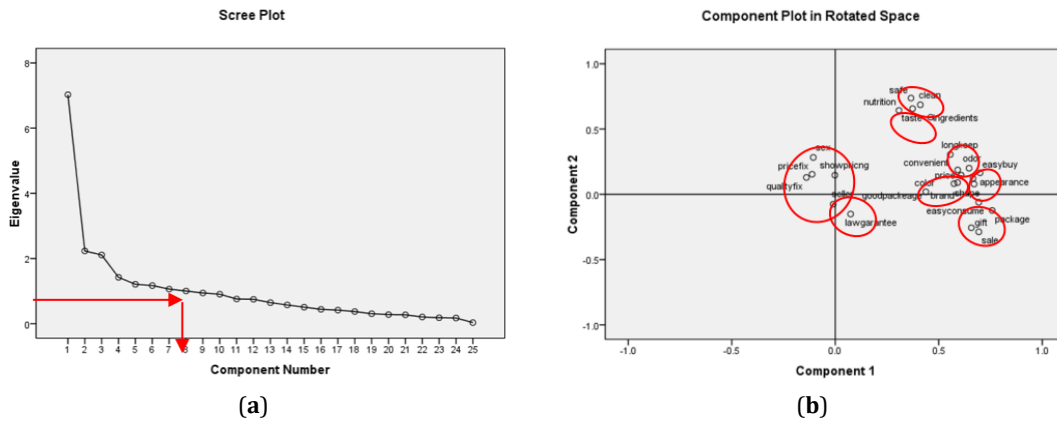


Figure 2. Multivariate analysis: (a) Principal Component extraction; (b) mapping of factors decision.

Factors along the PC1 axis, it was found that the factors that affect the purchase decision include the selection factor and induce factor, which strongly influences the purchase decision. In contrast, the fleshly factor, visual factor and safety factor greatly influence the decision. In contrast, convenience has little influence on purchase decisions. The PC2 axis indicated that the safety factor had a very high influence on the purchase decision, but the selling factor had low intention. The previous study showed how factor analysis can simplify various aspects of complicated school nutrition settings into clear categories, which can then be used to evaluate how these categories relate to student health outcomes. The results were varied, suggesting that limiting unhealthy foods in schools is linked to less added sugar consumption. More long-term studies are necessary to confirm the effectiveness of this approach in identifying beneficial school nutrition environments<sup>[51]</sup>. Furthermore, Principal Component Analysis (PCA) was used for medium-sized poultry farmers. The findings included three key areas consisting of farmers' attitudes, awareness and views on reducing waste of the poultry waste<sup>[52]</sup>.

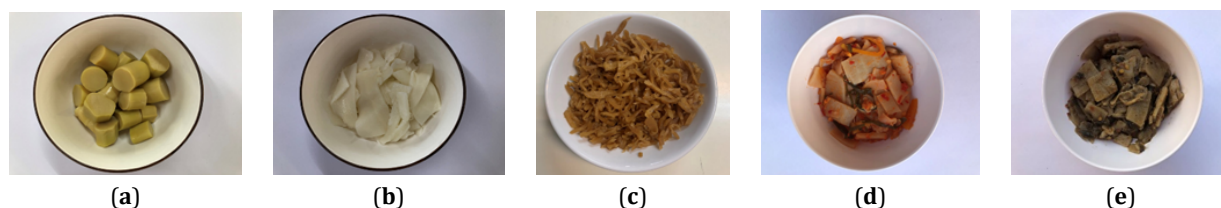
### 3.3. Sensory Evaluation of Bamboo Shoot Products

A sensory evaluation and purchase intension of processed bamboo shoot products (Figure 3) were as-

essed and reported in Table 6. A total of five processed bamboo shoot products were classified into 2 categories: original and modern cuisines. While original dishes included boiled bamboo shoots and pickled bamboo shoots, newly developed cuisines included preserved bamboo shoots, kimchi bamboo shoots, and bamboo shoot soup. The original dishes appeared to receive higher liking scores for all evaluated attributes including colour, flavour, texture and overall acceptance as compared to the newly developed recipes. These findings suggested that sensory characteristics had a significant impact on consumers' acceptance of processed bamboo shoot products. Given that kimchi and preserved bamboo shoots, along with bamboo shoot soup, were recently created dishes, customers might not be familiar with their sensory characteristics, which led to lower liking scores across the assessed qualities. A number of studies have shown that familiarity is one of the key elements affecting consumer acceptability<sup>[53-56]</sup>, especially when new recipes were introduced to the market<sup>[57]</sup>. The more consumers are familiar with the meal, the more likely they are to accept and purchase it. The acceptability and intentions are combined when it demonstrates favourable colour, flavour, texture and overall perception<sup>[58]</sup>. In addition to having an undesirable effect on product acceptability, unfamiliarity with the product or inadequate information also raises concerns about its safety. Customers were therefore more likely to

purchase original bamboo shoot products (88.5–89.4%), which had more recognizable sensory characteristics and a more secure sensation, than the recently developed bamboo shoot recipes (63.3–80.6%). The importance of sensory characteristics, including colour, texture, and flavour in influencing customer choices for processed food products has been highlighted in earlier research<sup>[20, 21]</sup>. Similar to this, the current study empha-

sized that frequently concentrates on specific sensory features. These qualities are particularly significant for boiled and pickled bamboo shoots, as they garner the highest customer acceptability ratings. However, this study combines sensory evaluations with multivariate analysis, which distinguishes other aspects like price and perceived nutrition as important determinants of purchasing decisions, in contrast to previous research.



**Figure 3.** Processed bamboo shoot samples of local entrepreneur: (a) boiled bamboo shoots, (b) pickled bamboo shoots, (c) preserved bamboo shoots, (d) kimchi bamboo shoots, and (e) bamboo shoot soup.

**Table 6.** The sensory evaluation of processed bamboo shoot products.

Category	Processed Products	Colour	Hedonic Scoring 9-Point Scale			Purchase Intention * (%)
			Flavour	Texture	Overall Acceptance	
Original	Boiled bamboo shoot	7.0 ± 0.5	6.8 ± 0.8	7.1 ± 0.8	7.0 ± 0.8	88.5
	Pickled bamboo shoot	6.9 ± 1.0	6.7 ± 0.5	6.9 ± 0.5	6.8 ± 1.0	89.4
Modern	Preserved bamboo shoot	6.2 ± 1.4	6.1 ± 1.2	6.0 ± 1.0	6.0 ± 1.0	63.3
	Kimchi bamboo shoot	6.2 ± 0.5	6.3 ± 1.5	6.2 ± 1.1	6.2 ± 1.1	78.4
	Bamboo shoot soup	6.3 ± 1.0	6.3 ± 1.2	6.4 ± 1.5	6.5 ± 0.8	80.6

\* Percentage in each row.

Therefore, future efforts should focus on optimizing these attributes to increase consumer satisfaction and purchasing with the intent of newly developed products. These insights highlight manufacturers’ need to remain deeply accommodated to consumer perceptions when introducing new offerings. The next research could lower original product costs, so price becomes the main factor affecting customer reactions. This should be done using effective management strategies, especially for new product groups where food quality is crucial. Factories must ensure food safety and use appropriate technology that aligns with their business plans. In addition, Bamboo entrepreneurs should work together to build a strong team of human resources and market their products. Also, studying collaboration can help share processing, knowledge and skills for boosting competitiveness in the market. Furthermore, bamboo shoot-based product innovation could focus on bioactive compounds that support human health, and the 2,4-DTBP

in bamboo shoots is a key compound for anti-diabetes concerns<sup>[59]</sup>. The noodles fortified with bamboo shoots have improved nutritional value and are without sensory effects<sup>[60]</sup>. This way, it is an alternative product to consumers in Asia countries.

## 4. Conclusion

Dishes prepared with bamboo shoots are widely consumed in Thailand. In Prachinburi, small enterprises leverage the Tong Sriprachin variety to highlight the significance of commercial zones in facilitating trade. There is potential to enhance the original product to different markets. The research investigated the consumer’s behavior, intentions, and preferences for local products using mixed methods to analyze the response. The Study of factors affecting the decision to purchase bamboo shoot products started with a qualitative focus group discussion exploring the bamboo business supply chain of Prachinburi enterprises. The results showed that a qual-

itative focus group discussion by bamboo food supply chains provides 25 items of marketing mix. The marketing framework classified 25 items consisting of 13 for the product, 3 for price, 6 for place, and 2 for promotion. After that, all items were collected to design the questionnaire to evaluate the consumption behavior of bamboo shoot products. The study of consumption behavior of bamboo shoot products through a consumer sampling survey indicated that the demographic information of the 300 respondents was 53.0% female and 47.0% male, with the majority being between 20–30 years old to 30–40 years old, which was had a bachelor's degree is 63.9% stayed in Bangkok, Pathum Thani, and Ayutthaya provinces. Bamboo shoots are a well-known food among Thai citizens, with most people familiar with them through direct experience or cultural influences. Consumer behaviours analysis reveals a diverse array of culinary applications for bamboo shoots. Various dishes were consumed, including bamboo shoot soup, bamboo shoots boiled with pork bones, curry with chicken mixed with bamboo shoots, and stir-fried with eggs and curry paste. Bamboo shoots are a widely recognized food item among the Thai people. Furthermore, an analysis of consumer behaviour highlights the varied culinary uses of bamboo shoots, featured in several dishes such as bamboo shoot soup, boiled bamboo shoots with pork bones, chicken curry with bamboo shoots, and stir-fried bamboo shoots with eggs and curry.

Through consumer survey, multivariate analysis, factor analysis, and PCA were applied to extract the importance of 8 groups. By logistic regression, Overall acceptance was significantly impacted for the original product of boiled bamboo shoot and pickled. Meanwhile, preserved bamboo shoot, kimchi bamboo shoot, and bamboo shoot soup were significant with overall acceptance favourable colour and appearance characteristics. This suggested that new products had more of a need for food attributes perception, which increased inceptions and the chances of buying. Additionally, PCA mapping provided a new name group, indicating that the delicious, safety, and convince factors were superior in the purchase decision. Additionally, price is the main factor in original products, but nutrition and food standards affect purchasing intention for new products. Con-

sumers may be concerned about safety because it is new or need more information about the product. In addition, Consumer preferences were studied through sensory evaluations in a quantitative study. The analysis of bamboo shoot products showed that original products were rated higher than newer ones. Enhancing features like colour, flavour, and texture is important to attract more buyers. Sensory aspects are crucial for consumers when they choose processed foods, particularly for new products that are not well-known. Local business owners should improve their pricing and intention affecting by using the suitable technology in their factories to ensure successful businesses.

The findings offer practical insights for stakeholders. Entrepreneurs should focus on improving sensory attributes like colour, flavour, and texture while ensuring food safety and competitive pricing. Policymakers can support SMEs by promoting quality standards and raising awareness about the nutritional and sustainable benefits of bamboo shoot products. Marketers should highlight these attributes in targeted campaigns and enhance product availability to meet consumer demands. These strategies collectively foster consumer trust, expand market reach, and boost the competitiveness of bamboo shoot products. However, this study has limitations. The number of respondents and the purposive sampling method restrict the generalizability of the findings to the broader population. Future studies should consider larger and more representative samples to strengthen the conclusions and applicability of the results. In addition, we should explore consumer preferences for bamboo shoot products in international markets to identify potential export opportunities and cultural differences in taste preferences. Studies could also focus on testing additional bamboo shoot-based product innovations, such as ready-to-eat meals or fusion dishes, to expand product offerings.

## Author Contributions

S.A.: Conceptualization, methodology, formal analysis, investigation, validation, writing-original draft preparation; Janejira Phakawan: Investigation, data collection, writing-review and editing; S.P.: Investigation,

data collection, resources, writing-review and editing; S.C.: Investigation, writing-review and editing; K.W.: Conceptualization, investigation, data curation, project administration, supervision, writing-review and editing, funding acquisition

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## Institutional Review Board Statement

The study was conducted in accordance with the Declaration of Helsinki, and approved by the Ethics Committee of Rajamangala University of Technology Thanyaburi (Ethical code RMUTT\_REC No.82/66).

## Informed Consent Statement

Informed consent for this work was obtained from all subjects involved.

## Data Availability Statement

The data generated during this work are available from the corresponding author on reasonable request.

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## Conflict of Interest

Authors disclose no conflicts of interest.

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