PLS-SEM algorithm for the decision to purchase durian milk with seeds

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Abstract. This research's primary purpose was to research these factors' influence on buying decision durian milk with seeds. We gathered research data from 300 consumers in Ho Chi Minh City, Vietnam. The research model was proposed from previous researches. Besides, we applied the PLS-SEM Algorithm with SmartPLS software for data analysis. Partial least squares (PLS) path modeling is a variance-based structural equation modeling (SEM) method that is broadly implemented in business and social sciences. It is a new statistical tool for the research method. The research results showed that factors (brand, product availability, product reference group, product quality, and promotion activities) positively affected purchasing decisions.

1. Introduction
A purchasing decision of a product or a service was one of the crucial characteristics of companies focusing on them. It was essential for companies to know the consumer's purchasing process, and base on that, the managers may adjust the sales strategy for their needs accordingly. Besides, marketers must understand the different features that purchasers evaluated to attract them was. Consumers examined options and evaluated them in terms of several traits. Consumers, the quality of the goods and services, and the situation's decision-making are all considerations that could impact the buying decision [1]. Some studies said that factors such as brand, product availability, the product reference group, product quality, product price, promotion activities have determinants of purchasing decision [2-5]. Up to now, few studies in Vietnam researching factors such as brand, product availability, product reference group, product quality, product price, promotion activities have determinants of purchasing decision in the field of durian milk with seeds. Therefore, this research's primary purpose was to research these factors' influence on buying decision durian milk with seeds.

2. Literature review and research hypothesis
Theories, models, and previous research on customer decision-making behavior were analyzed to identify different factors that influence purchasing decisions, such as social factors, product characteristics, company characteristics, marketing activities, and psychological factors [2]. A brand is a name, word, sign, logo, or design, or a combination of all of these, used to distinguish a seller's or group of sellers' products and services and to set them apart from competitors. Through practice and understanding, people gain beliefs and attitudes, which affect their buying behavior so businesses must win customers' confidence in their brands. The study of Zaeema and Hassan [2] pointed out a positive
relationship between Brand and purchasing decisions. From the above arguments, we have hypothesis H1:

Hypothesis H1: Brand has a positive influence on the decision to purchase durian milk with seeds

2.1. Product availability (PA)
Product availability is a barrier that prevents consumers from buying the product. Vietnamese people often buy food mainly from the normal distribution channel of traditional markets and roadside retailers or familiar sellers. Shopping at supermarkets has increased in central areas because consumers believe in food quality and convenience at supermarkets. Therefore, supermarkets need to layout and deliver products in a way most convenient for consumers. McEachern et al. [6] have shown a positive relationship between product availability and purchasing decision. From the above arguments, we have hypothesis H2:

Hypothesis H2: Product availability has a positive influence on a decision to purchase durian milk with seeds

2.2. The product reference group (PG)
The reference group is the degree to which the approaches of those involved in the buying decision are influenced. This factor is based on a model of the steps involved in reviewing options before making a purchase [7] measured by the relevant buyers (friends, co-workers, family ...) who like or dislike them. If these stakeholders are adamantly opposed to the buyer's purchase and the buyer has a strong relationship with them, the buyer is more likely to change his purchasing habits. In comparison, if the relevant people endorse the purchase, the buyer's preference for the item rises. The study of Zaeema and Hassan [2] has shown a positive relationship between the Reference Group and the purchasing decision. From the above arguments, we have hypothesis H3:

Hypothesis H3: The product reference group has a positive influence on the decision to purchase durian milk with seeds

2.3. Product quality (PQ)
A product's quality is measured by how well it meets current and potential consumer standards. Therefore, product quality is determined by the characteristics of the product and the buyer's reaction to those attributes. Managers need to know how their clients feel about the quality of products their company provides [8]. Marketers offer their consumers what they expect them to need based on this information [9]. Zaeema and Hassan [2] have shown a positive connection between product quality and purchasing decisions in their studies. From the above arguments, we have hypothesis H4:

Hypothesis H4: Product quality has a positive influence on the decision to purchase durian milk with seeds

2.4. Product price (PP)
Price is the amount a client gives for a product or the sum of the values that buyers trade for the advantage of having or using a product or service. Price greatly influenced customers' purchase decisions of a product/service. The price revealed evidence about a product and provided deep importance for the customers [3]. Besides, some authors [4,5] explained that most customers examined price as a vital factor influencing their purchase decisions. Some previous empirical studies said that the product price positively affected the purchase decision [4,5]. Therefore, from the above arguments, we have a hypothesis:

Hypothesis H5: Product price has a positive influence on the decision to purchase durian milk with seeds

2.5. Promotion activities (PAC)
According to Kotler and Keller [7], marketing campaigns share information about goods and companies indirectly or directly to encourage consumers to trust the company and its products and to
purchase business products. The basic objectives of marketing activities are to educate, convince, and remind the consumer about their goods. Businesses educate customers of the presence of their goods and products on the market, reassure them of the benefits of their products over competing brands, and remind them to recall the product when needed through content and advertisements. The study by Dickieson et al. [10] indicates consumers interpret marketing statements positively influencing their actions in advertising goods on brands and assertions regarding product quality in the media. The study of Zaeema and Hassan [2] has shown a positive relationship between promotion activities and buying decisions. From the above arguments, we have hypothesis H6:

Hypothesis H6: Promotion activities have a positive influence on a decision to purchase durian milk with seeds.

2.6. Purchasing decision (PD)
The study of Noh and Lee [11] focuses on the intention of the purchasing decision-maker in a company as a marketing point for business-to-business transactions. Purchasing decisions also face doubt regarding the purchasing of goods from businesses that are not well known. Goods are considered important buying decisions because they are typically costly durable goods and can remain competitive in manufacturing only if the goods are handled efficiently over the long term. Of the many businesses that do not vary significantly in their technology, which provider do buyers choose? Thus, from the above arguments, we have a hypothesis:

Hypothesis H7: Purchasing decision has a positive influence on an Intention to Use to purchase durian milk with seeds.

3. Methodology
To evaluate the proposed research model, we used SmartPLS software and the PLS-SEM Algorithm. Path modeling using partial least squares (PLS) is a variance-based structural equation modeling (SEM) tool commonly used in business and social sciences. It is a new statistical tool for the research method [12]. Two phases of experimentation were used to verify the proposed study model and hypotheses: (1) The calculation model is evaluated, and (2) the structural model is evaluated [13]. The measurement items of the constructs from previous studies were revised and adjusted to accommodate the study context. The paper used a five-point Liker scale to measure the factors. The survey data was an examination of consumers living in Vietnam. The convenience sampling for this study was done in several areas of Ho Chi Minh City, Vietnam, with different groups of consumers based on gender and age. After the questionnaires were dropped because they did not have enough detail or answered the same questions, 300 responses were collected for the final study.

4. Results

4.1. Validity and reliability
Using the Partial Least Squares (PLS) procedure, the model and hypotheses presented were tested. The internal consistency, convergent and discriminant validity, and internal consistency of the reliability test were all evaluated through their loadings (Table 1 and 2). It should be noted that due to multicollinearity, certain elements in some structures had to be omitted from the measurement model.

| Factors and Items                        | Loadings |
|-----------------------------------------|----------|
| CLSP1 Durian Milk products have suitable nutritional value | 0.796    |
| CLSP2 Durian Milk has a flavor that is right for me and my family | 0.868    |
| CLSP3 Durian Milk products have full information | 0.859    |
| CLSP4 Durian Milk products contain no preservatives | 0.783    |
| CLSP5 Durian Milk products are safe for health | 0.760    |
GCSP1  The price of Durian Milk products is consistent with the quality  0.816
GCSP2  The price of Durian Milk products is relatively stable  0.848
GCSP3  The price of Durian Milk products is in line with income  0.807
GCSP4  Reasonable price compared to products of the same type  0.773
HDCT1  The company’s Durian Milk products have many promotions  0.863
HDCT2  The company’s Durian Milk products were widely advertised  0.894
HDCT3  Regularly there are discounts for the company’s Durian Milk products at the store  0.875
HDCT4  I was promptly informed about promotions on Durian Milk products of the company  0.851
NTK1  Durian Milk products are used by family members  0.872
NTK2  Durian Milk products recommended by friends  0.867
NTK3  Durian Milk products are trusted by many people  0.847
NTK4  Durian Milk products introduced by the salesman  0.692
QDM1  I think buying the company’s Durian Milk product was the right decision  0.841
QDM2  When buying food, I will choose to buy the Durian Milk products of the company  0.860
QDM3  I will introduce my relatives to buy fruit milk products of the company  0.585
QDM4  I believe that buying the company’s Durian Milk products is worth the money I spend  0.813
SCSP1  The company’s Durian Milk products are always available on stalls  0.852
SCSP2  The layout of the company’s Durian Milk products on the counter is convenient for me to search  0.861
SCSP3  The company’s display area for Durian Milk products at the store is convenient for purchasing products of the same type  0.867
SCSP4  The store offers many support services when purchasing Durian Milk products of the company  0.862
TH1  I am assured with the company’s brand of Durian Milk products  0.850
TH2  I choose to buy the company’s Durian Milk products from a well-known brand  0.846
TH3  I choose to buy the company’s fruit milk products from a well-known brand  0.868
TH4  I believe in the quality of Durian Milk products of the company that a famous brand brings  0.772
YSDSP1  Intend to use durian milk products regularly as a nutritious drink  0.620
YSDSP2  I will buy durian milk products as a gift  0.869
YSDSP3  Willing to buy durian milk products made in Vietnam  0.887
YSDSP4  I will recommend durian dairy products (if any) to friends and relatives  0.820

4.2. PLS-SEM algorithm
Concerning internal consistency and convergent validity (Table 2), composite reliability (CR) exceeds. Nunnally and Bernstein [14] suggested a value of 0.7 as an adequate standard for reasonable reliability. NTK4, QDM3, and YSDSP1 are not accepted.

Table 2. The reliability and validity

|   | CR   | AVE | ITU | PA | PAC | PB | PD | PG | PP | PQ |
|---|------|-----|-----|----|-----|----|----|----|----|----|
| ITU | 0.879 | 0.650 | 0.806 |
| PA  | 0.919 | 0.740 | 0.459 | 0.860 |
| PAC | 0.926 | 0.758 | 0.515 | 0.809 | 0.871 |
Regarding convergent validity, by overcoming the cut-off of 0.5, all the constructs meet the AVE criterion suggested by Fornell and Larcker [15]; that is, each construct explains at least 50 percent of the variance of the indicators assigned. The criterion of discriminant validity is also met, as the square root of the variance between the construct and its indicators (AVE) shown in the main diagonal values (in bold) is greater than the correlations between each construct and any other construct (the rest of the matrix).

![Figure 1. PLS-SEM algorithm](image)

PLS-SEM algorithm demonstrates the structural model's estimate and validation in figure 1. After confirming the absence of multicollinearity (VIF<5 for all indicators), the parameters were calculated using a 5000-sample bootstrap procedure; they were relevant in all cases (p<0.05), except for the direction between the parameters.

### 4.3. Hypothesis testing

| Path   | Coefficients | SE  | t-value | P-value |
|--------|--------------|-----|---------|---------|
| PA -> PD | 0.259         | 0.069 | 3.739   | 0.000   |
| PAC -> PD | 0.157         | 0.072 | 2.193   | 0.029   |
| PB -> PD | 0.255         | 0.061 | 4.177   | 0.000   |
| PD -> ITU | 0.527         | 0.058 | 9.045   | 0.000   |
The purchasing decision (PD) by the consumers has positive influences (Table 3) both on five factors ($\beta = 0.259, 0.157, 0.255, 0.527, 0.164; p < 0.05$) and do not affect two elements ($\beta = 0.096, 0.069; p >0.05$). Five relationships are positive and statistically important; both hypotheses 5 and 7 are not accepted because P-value is greater than 0.05.

5. Implications and applications
This research has analyzed the influence of factors on purchasing decisions regarding durian milk with seeds. Several academic conclusions can take from the findings, but they are also important to purchasing management. Compared with the study of Zaeema and Hassan [2] conducted in the Maldives with the survey subjects who are customers buying canned tuna, there is a similarity of all impact factors. Thus, the author's research once again confirms that the research model of Zaeema and Hassan [2] is suitable for the research conditions in Vietnam. However, the influence level of the factors is not the same when studying in Vietnam. In addition to the similarities above, the author's research has added many new factors that affect the decision to buy Durian Milk products such as the availability of the product. Similar research by Zaeema and Hassan [2] has demonstrated the relationship between Personal Characteristics and customer buying decisions. In the author's study, the research results are similar to the Zaeema and Hassan [2], that is, the author has found a relationship between the education level and the buying decision of the customer. The relationship between gender, income, age, and the customer's decision to buy Durian Milk in Vietnam has not been found yet for different products, which need to be researched for each specific product before applying it into practice.

Finally, the study was only conducted with survey subjects who were customers who bought Durian Milk products with a convenient sampling method, so the research results have limitations about the representative sample. Therefore, further research should use probabilistic sampling to increase representativeness. This study only explains 70.4% of the variation of the Decision to buy Durian Milk products by the variation of 06 independent variables. Hypotheses H5 and H7 are not supported, so PP and ITU are excluded from the model. Thus, many other factors are influencing the decision to buy Durian Milk products that research has not found yet. Therefore, further research needs further research to find out some new factors influencing Durian Milk customers' decision to buy Durian Milk products.

Conflicts of Interest
The authors declare no conflict of interest.

Data Availability
The authors will supply the surveyed data through emails if readers request.

Acknowledgments
This paper was funded by IUH, Vietnam.

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