# Willingness to Pay for Soy Milk Among Muslim Farming Households in Southern Thailand

Narid Thaiburi[1], Teerat Phubenyapong[1,*], Somruedee Yorsin[2],
Jidapa Milinthangkun[3], Parpitchaya Chintapitaksaku[4]
Program Agricultural Extension and Development, Narathiwat College of Agriculture and Technology [1]
Faculty of Medicine, Princess of Naradhiwas University[2]
PNU Witayanusorn School[3]
Department of Agricultural Extension and Communication Faculty of Agriculture Kasetsart University [4]
Corresponding Author, E-mail: thuwapol333@gmail.com*

**Received** 16 June 2025; **Revised** 26 June 2025; **Accepted** 27 June 2025

## Abstract

The purposes of this study were to examine the behavior of tourists who have traveled to Khon Kaen province and to study multi-attraction visits in Khon Kaen Province, which is currently ranked second in the Northeastern region for visitor numbers and tourism income. The study population consisted of tourists who have traveled to Khon Kaen province. This research identified the most popular attractions taken by tourists from one attraction to another. Using primary data collection methods, the study

found that the five most popular tourist attractions were Central Plaza Khon Kaen, Wat Nong Wang, Ubolratana Dam, Ton Taan Market, and Khon Kaen Zoo. The data was analyzed using descriptive statistics for general information and tourist behavior, and inferential statistics for tourist attraction sequences through Social Network Analysis (SNA) using the UCINET program to demonstrate the travel network within Khon Kaen Province. The study revealed that Central Plaza Khon Kaen was the central tourism attraction, with tourists typically traveling from there to Ton Taan Market, Ubolratana Dam, Wat Nong Wang, and Khon Kaen Zoo. The findings regarding tourist travel patterns can inform policy planning for tourism supply and development, including linking tourism programs, integrating attractions, clearly defining tourist areas, planning transportation systems, developing travel infrastructure, and maintaining roads and traffic connections between attractions, all to further develop Khon Kaen's tourism potential.

**Keywords:** Tourist Behavior, Social Network Analysis, Khon Kaen Tourism: Multi-Attractions

## 1. Introduction

Today, the importance of health is increasing. The demand for protein of the world's population has increased. The concept of using plants as a protein source has become popular with many consumers. There are more and more products to replace animal protein sources. The main reasons for replacing animal protein with plant protein include changes in lifestyle and health concerns that may affect the body. Receiving information about the dangers of saturated fatty acids from animals is the main factor that makes consumers seek out plant-based protein sources instead. Soy milk is considered the food that is used to replace animal protein in the first place because soy

milk has a protein content similar to that of cow's milk, but has very little saturated fat and no cholesterol. Soy milk does not contain lactose, which is different from cow's milk. Therefore, soy milk is safe for people who are lactose intolerant. For the reasons mentioned above, soy milk is considered a healthy alternative to cow's milk for children, teenagers, and adults. (Tsang, 2011) Soybeans contain high-protein nutrients and have nutritional value similar to protein in meat. If you eat a high enough amount of soybeans, your body will receive enough protein as it needs. With the nutritional value of soybeans and their benefits to the body, today there are many types of soy products and they are easy to consume. Soy milk or tofu In Thailand, ready-to-drink soy milk has been consumed for a long time. It is the third country in the world that uses soybeans to make soy milk. According to the data, there is an average consumption of 12 liters per person per year and a share of the ready-to-drink milk market of up to 40.1 percent (Intelligent Center for Food Industry, 2017) and there is a tendency to expand continuously. This is a result of marketing by entrepreneurs who encourage consumers to be aware of the benefits of soy milk, which are suitable for different characteristics of consumer groups, such as gender, age, or popularity. It is expected that the growth of the soy milk market will continue to grow. The analysis of consumer preferences for soy products is very relevant. In the context of Narathiwat Province, Thailand, 82 percent of the population is Muslim with an average income of 17,512 baht per month per household (Narathiwat Provincial Statistical Office). The main occupation of the population in Narathiwat Province is small-scale farmers with low income. Access to various sources of protein is not enough to meet the demand. Therefore, finding a product to replace protein from soy milk is another alternative source of animal protein. Analysis of consumer demand affecting the search for a product to replace animal milk and finding a source of protein for health Analysis of willingness to pay (WTP) for purchases

considered by low-income consumers when purchasing different animal protein alternatives. Casual model estimation combined with WTP to better understand consumers and their true purchasing behavior.

## 2. Research Objectives

2.1 To estimate the average willingness to pay (WTP) for 300 ml of soy milk among Muslim farming households in Narathiwat Province using the Double Bounded Contingent Valuation Method (CVM).

2.2 To analyze the socioeconomic and marketing factors influencing parents' decisions to purchase soy milk, using a Multinomial Logit Model

## 3. Research Methodology

This study was survey research. The population used in the study were representatives of agricultural households in Narathiwat Province in 13 districts with a total of 400 samples with children aged 6-14 by using purposive sampling. Questionnaire was a tool to collect primary data from the sample.

**Table 1 Number of samples in each district**

| Districts | Number of Samples |
|---|---|
| Mueang Narathiwat | 31 |
| Tak Bai | 31 |
| Yi-ngo | 31 |
| Bacho | 31 |
| Si Sakhon | 31 |
| Rueso | 31 |
| Ra-ngae | 31 |
| Chanae | 30 |

| Districts | Number of Samples |
|---|---|
| Cho-airong | 30 |
| Su-ngai Padi | 31 |
| Su-ngai Kolok | 31 |
| Waeng | 31 |
| Sukhirin | 30 |
| **Total** | **400** |

**3.1 Data collection**

The study was a randomized survey study. It was accidental sampling that the buyers did not know how much they were in the starting price group. The main places for field data collection were community stores, flea markets, and convenience stores. The data was collected from September to October 2022.

**3.2 Research tools**

In this study, primary data were collected by personal interview and structured questionnaires as tools. The questions were closed-ended and open-ended, divided into 4 parts, consisting of 1) general information such as gender, age, education level, average monthly income, 2) knowledge and attitude towards soy milk, 3) willingness to pay for soy milk, and 4) suggestions on soy milk products. Closed-ended questions (Double Bounded CVM) were used to ask parents whether they were willing to pay for 300 ml. soy milk compared to 300 ml. cow milk as Bid 1 and Bid 2. According to pre-test survey from 30 examples of parents who were willing to pay with open-ended questions from Bid 1, it was found that the willingness to pay more was the first 4 highest levels of popularity at the price of 2, 3, 4, and 5 Baht with the size of 300 ml, to reduce bias resulting from the Starting Point Bias and reduce the variance in the WTA value. The proposed price level was determined based on the preliminary survey as a result of 30 samples and analyzed Percentile.

**3.3 Data analysis**

This study aimed to determine parents' willingness to pay for soybean milk by using the concept of Contingent Valuation Method (Double Bounded: CVM). The answers were presented in four different ways: Yes Yes (YY: accept the first time price and definitely buy in the second price), Yes No (YN : accept the first time price but do not accept the second time price: only buy when the first time price increases), No Yes (NY: do not accept the first time price but accept second time price: buy when the price is reduced in the second time), and No No (NN: do not accept the first price and the second time: definitely not buy). Each option had a reference price as follows:

**Table 2 Reference price in case of various starting base prices Unit : Baht**

| Cases | Yes Yes | Yes No | No Yes | No No |
|---|---|---|---|---|
| Reference price when the base price starting at 2 Baht | 4 | 2 | 1 | 0 |
| Reference price when the base price starting at 3 Baht | 6 | 3 | 1.5 | 0 |
| Reference price when the base price starting at 4 Baht | 8 | 4 | 2 | 0 |
| Reference price when the base price starting at 5 Baht | 10 | 5 | 2.5 | 0 |

Source: Calculations using Bidding games technique, based on data from questionnaires.

From Table 2, for example, if a consumer had a base price starting at 2 Baht, they would be first asked if the price of 300 ml. soy milk higher than the normal price of 2 Baht/ box, were you willing to pay more? If they answered that they were happy, they would ask a second time. If the price increased by another 2 Baht/ box (if combined with the first time, it would become 4 Baht/ box), were you willing to pay again? If they said they were willing to pay again, it was called a Yes Yes case and the reference price of this consumer was 4 Baht/ box. If the first time they said yes while the second time they said no, it was called a Yes No case and the reference price was 2 Baht/ box. In the next case, if the first time the answer was not happy, they would be asked the second time. If the price increase was only 1 Baht (from the original increase of 2 Baht), were they willing to pay or not. If the second time they said they were willing to pay, it is called a No Yes case and the reference price of this consumer was 1 Baht. For the last case, if the first time and the second time they said no for both times, it was called a No No case and the reference price of this consumer was 0 Baht. In the base case, the starting price was 3 Baht or 4 Baht or 5 Baht, it would be referenced in the same way.

The probabilities for each choice would be the actual value obtained from the questionnaire. It could be written as an equation as follows:

$$Prob(YY) + Prob(YN) + Prob(NY) + Prob(NN) = 1$$

(1) โดยที่ $0 \leq Prob(YY) \leq 1, 0 \leq Prob(YN) \leq 1, 0 \leq Prob(NY) \leq Prob(NN) \leq 1$

Therefore, the average willingness to pay was

$$Mean\ WTP\beta = \sum(nij \text{ X } pij)/\sum nij$$

(2) $n$ = number of decision makers in different ways

$i$ = choice chosen by the respondent as follows $i$=1 Yes Yes, $i$=2 Yes No, $i$=3 No Yes, $i$=4 No No

$j$ = If the starting price is specified, consisting of $j$ =1 is the starting price of 2 Baht, $j$ =2 is the starting price of 3 Baht, $j$ =3 is the starting price of 4 Baht, $j$ =4 is the starting price of 5 Baht

$pij$ = The reference price of the case where various starting prices are set, consisting of

p11= 4 Baht, p21 = 2 Baht, p31 = 1 Baht, p41 = 0 Baht

p12= 6 Baht, p22 = 3 Baht, p32 = 1.5 Baht, p42 = 0 Baht

p13= 8 Baht, p23 = 4 Baht, p33 = 2 Baht, p43 = 0 Baht

p14= 10 Baht, p24 = 5 Baht, p34 =2.5 Baht, p44 =0 Baht

To study of factors affecting willingness to pay, Multi-nomial Logit Models was used for analysis. It was a multiple-choice model used to define the equations and variables used in the study as follows:

$$WTP_i = Constant + \beta_1 Gen + \beta_2 Chill + \beta_3 Edu + \beta_4 Inc + \beta_5 Pri + \beta_6 Pack + \beta_7 Chan + \beta_8 info + \beta_9 Prom + \varepsilon_l$$

$WTP_i$ was an alternative or a form of decision making in 4 alternatives: Yes Yes, Yes No, No Yes, No No, depending on how the person would make the decision.

The Gen variable was sex. The researcher hypothesized that female parents would be more likely to buy 300 ml. soy milk compared to male parents.

The Chill variable was the number of children in the family. The researcher hypothesized that parents would be more likely to buy 300 ml of soy milk compared to the higher number of children in the family.

The Edu variable was the level of education. The researcher hypothesized that parents with postgraduate education were more likely to purchase 300 ml soy milk compared to parents with lower education.

The Inc variable was family income. The researcher hypothesized that parents of higher-income households had more opportunity to buy 300 ml of soy milk compared to households with incomes below 10,000 Baht per month.

The Pri variable was price. The researcher hypothesized that discounting made it easier for parents to make purchasing decisions compared to not discounting.

The Pack variable was the nature of the packaging. The researcher hypothesized that the appearance of the packaging would make it easier for parents to make a purchase decision than less attractive packaging.

The Chan variable was distribution channels. The researcher hypothesized that if the distributors had the product at the store and immediately delivered the product to the customers, it would help customers to make a purchase decision easier than not having products delivered immediately or need to make an appointment later.

The Info variable was marketing communication. The researcher had a hypothesis that modern media (online media) would reach consumers better than traditional media (such as radio broadcasting).

The Prom variable was marketing communication. The researcher had a hypothesis that the communication of soy milk consumption would affect the decision to purchase soy milk. It would help parents make an easier decision to buy soy milk compared to no promotion. However, the analysis would be the comparison of pairs only in the case of 1) Yes Yes (accept the price in the first and second time: definitely buy) compared to the base case No No (do not accept the price in the first and second time: definitely do not buy), and 2) No Yes (do not accept the first time price but accept the second time price: buy when the price decreases in the second time) compared with

the base case No No (do not accept the first and second time price: do not definitely buy).

## 4. Research Findings Summary

Willingness to pay for soy milk compared to 300 ml. cow milk were from the data collected from questionnaires for analysis based on Contingent Valuation Method (Double Bounded CVM). Calculating by using equation (2), it was found that willingness to pay for additional was 3.15 Baht per 300 ml using a computer program to study factors affecting willingness to pay by using Multinomial Logit Models to compare decision factors in pairs as the case of No No. The study results were as follows:

**Table 3 Results of comparison of decision factors in pairs**

| | Case Yes Yes | | | | Case No Yes | | | |
|---|---|---|---|---|---|---|---|---|
| | | | Wald | | | | Wald | |
| | Exp(b) | Std.Err | Static | P>l z l | Exp(b) | Std.Err | Static | P>l z l |
| Gen | 0.26 | 0.74 | 3.22 | 0.114 | 2.42 | 1.01 | -0.26 | 0.511 |
| Chill | 4.45 | 0.19 | -2.56 | 0.015** | 0.36 | 0.25 | -1.51 | 0.132 |
| Edu | 3.24 | 0.92 | 3.26 | 0.008*** | 1.47 | 1.22 | 1.22 | 0.011** |
| Inc | 1.40 | 0.24 | -2.60 | 0.014** | 1.30 | 0.00 | 0.18 | 0.840 |
| Pri | 2.98 | 0.14 | 2.41 | 0.21** | 1.90 | 0.54 | 2.60 | 0.008*** |
| Pack | 1.84 | 0.16 | 1.42 | 0.188 | 0.74 | 0.13 | -1.74 | 0.056 |
| Chan | 0.88 | 0.15 | -0.41 | 0.670 | 0.68 | 0.19 | -1.69 | 0.091 |

| | Case Yes Yes | | | | | Case No Yes | | |
|---|---|---|---|---|---|---|---|---|
| | | | Wald | | | | Wald | |
| Info | 1.01 | 0.16 | -2.29 | 0.119 | 0.24 | 0.18 | -1.76 | 0.097 |
| Prom | 2.36 | 0.59 | 0.32 | 0.042** | 2.58 | 1.02 | 2.21 | 0.072 |
| cons | 0.03 | 0.02 | -4.59 | 0.000 | 0.05 | 0.08 | 2.72 | 0.024 |
| Obs | = | 400 | 3.22 | 0.114 | 2.42 | Loglike-Lihood | = | 400 |
| LR Chi2(30) | = | 115.54 | | | | Pseudo R2 | = | 0.1128 |
| Prob>chi2 | = | 0.0000 | | | | Base Case | = | No No |

Source: From calculations

Note *** Significance level at 99 %

** Significance level at 95 %

Case Study 1) Yes Yes (first and second acceptance: definitely buy) comparing to the base case No No (first and second acceptance of price: definitely not buying)

From Table 3, the decision factor was a 300 ml pair of soy milk, Yes Yes (accept the price in the first and second time: definitely buy) by giving the base case No No (do not accept the first and second price: definitely not buy).

The results of this research revealed that there were 5 factors that significantly influenced purchasing decisions as follows: number of children in the education level, household income, price, and marketing communications. There was a positive relationship with purchasing decisions and was based on assumptions that could be explained as follows:

The number of children in the family was the number of children in the family with a chance to decide to buy soy milk 4.45 times or increased by 345% compared to families with higher number of children in the family. Parents' educational level, i.e, parents with a bachelor's degree were more likely to decide to buy soy milk 3.24 times or 224% compared to parents with educational level lower than bachelor's degree.

Family income was the higher the family income as a chance to decide to buy 300 ml soymilk 1.40 times or increased by 40% compared to families with incomes below 10,000 Baht per month.

In terms of price, reducing the price of 300 ml. soy milk would give parents the opportunity to make a purchase decision, equal to 2.98 times or 198 percent increase compared to the selling price without a normal sale price. Marketing communication referred to parents who were informed of the benefits of soy milk through modern media (online media). They were more likely to make a purchase decision equal to 2.36 times, or 136 percent increase compared to informed consumers about organic rice through traditional channels (e.g. radio broadcasting).

Result of Case Study 2) No Yes (do not accept the price the first time but accept the price the second time: buy when the price decreased in the second time) compared to the base case No No (do not accept the first- and second-time price: definitely not buy)

From Table 3, the data showed the factors that affected the decision to buy 300 ml. No Yes (do not accept the price in the first time, but accept the price in the second time: buy when the price decreases in the second time) by giving the base case No No (do not accept the price in the first time and the second time: definitely not buy).

The results of this research found that there were two factors that had a statistically significant effect on the purchasing decision as follows: number of

children in the family, education level, household income, price, and sales promotion. There was a positive relationship with purchasing decisions and was based on assumptions that could be explained as follows:

Parents' educational level, i.e, parents with a bachelor's degree. There was a 1.47 times higher likelihood of purchasing soy milk or 47 percent more when compared to parents with educational level lower than a bachelor's degree.

In terms of price, reducing the price of 300 ml. of soy milk would give parents the opportunity to make a purchase decision equal to 1.90 times or 90% increase compared to the selling price that was not discounted.

## 5. Discussion of Research Findings

Willingness to pay more for soy milk, size 300 ml, is equal to 3.15 Baht per 300 ml. Soy milk is considered a food that consumers will know about the quality of the experience goods, consistent with the study of Tiyaphon (2019) reporting that consumers paid more. Consumers were willing to pay 4.81 Baht more for yoghurt, a food with its quality known from the label. This was consistent with Laassal & Kallas (2019) that price increased from the original increase of 6.2 percent.

From factors affecting the decision to buy soy milk from this research, it was found that the number of children in the family and marketing communications were consistent with Panchid (2018) stating that the personal factors in the family affect the decision to buy products, both personal and marketing factors. Factors of parents' education in terms of price, and family income was consistent with Rombach & Dean (2023) stating that consumers' knowledge of milk substitutes was a key factor in their willingness to pay for soy milk alternatives compared to the unit price in the United States. In terms of price, this is consistent with Yang & Dharmasena (2021). Consumers in the

United States are increasingly consuming plant-based dairy alternatives (called “plant-based milk” for short) than regular milk. The study was motivated by the need to consider the wide range of nutritional and quality attributes in plant-based milk and pricing that could answer consumer purchasing behavior and estimate the elasticity of demand.

## 6. Knowledge from Research

The results of this study were the willingness to pay more for 300 ml of soy milk, equal to 3.15 Baht per 300 ml. Factors affecting the decision to buy soy milk of a farmer’s family in Narathiwat Province consisted of 5 factors: the number of children in the family, marketing communications, factors of parents’ education in terms of price and family income, and gaining knowledge and understanding of the benefits of soy milk in children from parental knowledge or social media. It will stimulate the decision to buy soy milk for children in the household and can reduce malnutrition for children. However, the price of soy milk makes parents decide to buy it.

## 7. References

Benjamaphorn, K., & Narong, J. (2023). Factors associated with soy milk consumption behavior among students at a demonstration high school in northern Thailand. *Journal of Public Health and Health Science, 6*(1), 13-25. (in Thai).

Department of Agriculture. (2022). Beneficial Nuts. Retrieved from https://www.doa.go.th/pvp/wp-content/.

Komsan, S. (2009). *Logit model: Theory and application in economic research*. Chiang Mai: Center for Quantitative Analysis, Faculty of Economics, Chiang Mai University.

Kunlaya, W. (2020). *Using SPSS for Windows to analyze data* (2nd ed.). Bangkok: Chulalongkorn University Press.

Lueangrungsee, A. (2018). *Motivations for Consuming Ready-to-drink Soy Milk,* (Master's thesis). Mahidol University, Nakhon Pathom. Retrieved from https://archive.cm.mahidol.ac.th/bitstream/123456789/2846/1/TP%20MM.026%202561.pdf.

Meike, R., & Dean, D. L. (2023). Got milk alternatives? Understanding key factors determining U.S. consumers' willingness to pay for plant-based milk alternatives. *Foods, 12*(6), 1277.

Mohamed, L., & Zein, K. (2019). Consumers' preferences for dairy-alternative beverages using home scan data in Catalonia. *Beverages, 5*(3), 55.

Narathiwat Provincial Public Health Office. (2019). Food system strategy of Narathiwat Province, 2021–2025. Retrieved from http://www2.narathiwat.go.th/nara2016/files/com_order/2020-07_cf8d8340a1aa1e0.pdf.

Panchid, P., Montri, S., Aree, C., & Wasaphon, W. (2018). Willingness to pay and factors affecting the decision to purchase organic rice. *Liberal Arts Journal, Maejo University, 6*(1), 149–162. (in Thai).

Pornsuree, S. (2003). *Factors Influencing the Consumption Behavior of UHT Soy Milk in Bangkok,* (Master's thesis). Srinakharinwirot University, Bangkok. Retrieved from http://thesis.swu.ac.th/swuthesis/Mark/Pornsuree_S.pdf.

Sangjanchai, K. (2016). *Factors influencing the decision to purchase ready-to-drink tofu soy milk of consumers in Bangkok,* (Master's thesis). Thammasat University, Bangkok. Retrieved from

https://ethesisarchive.library.tu.ac.th/thesis/2016/TU_2016_5802030071_5809_4287.pdf.

Smart Center for the Food Industry. (2017). Ready-to-drink milk market in Thailand, 2012–2016. Retrieved from https://fic.nfi.or.th/market-intelligence-detail.php?smid=140.

Somdej, B. (2008). *Statistics for research*. Bangkok: Phi Phi Printing House.

Tiamphuak, M. (2020). Factors Influencing the Decision to Purchase Ready-to-Drink Soy Milk Among Consumers in Bangkok. Retrieved from http://www.mbaoneday-abstract.ru.ac.th/AbstractPdf/2562-1-1_1591772716.pdf.

Tingyi, Y., & Senarath, D. (2021). U.S. consumer demand for plant-based milk alternative beverages: Hedonic metric augmented Barten's synthetic model. *Foods, 10*(2), 265.

Tiyaporn, C., Sirirat, K., & Suthanya, T. (2020). Yogurt consumption behavior and willingness to pay for yogurt that uses biodegradable packaging for consumers in Hat Yai, Songkhla Province. *Khon Kaen University Research Journal of Humanities and Social Sciences, 8*(2), 75–87.

Tsang, G. (2011). Powerful Benefits of Soy. Retrieved from http://www.healthcastle.com/herb_soy.shtml.