



Factors Affecting Decision to Purchase Indo-Pacific Mackerels, Samut Sakhon Province: Consumer Case Study

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Abstract

Presently, the quantities of Indo-Pacific mackerel resources have been depleting continuously. However, prices of Indo-Pacific mackerel have not increased proportionately in comparison to the past. As there have been ongoing demands for Indo-Pacific mackerel consumption, consumer behavior is an important indicator for formulation of production plans and marketing strategies of fishery products because consumers have the power to make purchasing decisions. The objectives of the research of factors affecting decision to purchase Indo-Pacific mackerels, Samut Sakhon Province: Consumer Case Study, were to study (1) basic personal information and Indo-Pacific mackerel purchasing behavior of consumers, (2) marketing factors affecting consumer satisfaction of Indo-Pacific mackerels and (3) factors affecting willingness to pay for Indo-Pacific mackerel consumption. The study was conducted in the area of Samut Sakhon province during October 2017 and March 2019 to investigate consumer's behavior and willingness to pay for mackerel consumption. The data were collected by conducting interviews with 400 mackerel buyers using questionnaires and analyzed by regression equations. It was found that recognitions on tastes of Indo-Pacific mackerels from Samut Sakhon Province was the most influential factor for buyers to purchase mackerels. Most consumers, 73.75 percent, were willing to pay for Indo-Pacific mackerel even if mackerel prices increase in the future. Consumers were willing to pay an increase of 6.543 baht/bamboo basket for steamed mackerels. At the same time, they were willing to pay an increase of 19.101 baht/kilogram for fresh mackerels. Factors, including gender, personal incomes, religion (Buddhism), occupation (civil service) of the sample group, have positive correlation with willingness to pay for increased prices at statistical significance level of $\alpha = 0.01$.

Introduction

Indo-Pacific mackerels have the highest economic value among pelagic fish and are aquatic animal that are important to the way of life and food

culture of Thailand. Indo-Pacific mackerels are mainly used for consumption in the forms of fresh mackerels, steamed mackerels and salted mackerels. In addition to delicious taste, Indo-Pacific mackerels are also

traditional dish that has been with Thai kitchens for a long time. Indo-Pacific mackerels are used as main ingredient in variety of Thai cuisine. Fresh mackerels and steamed mackerels are often found in traditional fresh markets in Thailand. It can be said that mackerels are symbol of fertility in food which reflects abundant natural resources of the country and the quality of life of Thai people. Indo-Pacific mackerels comprise many nutrients including linoleic acid, which control cholesterol level and triglycerides in the bloodstream and Docosahexaenoic acid (DHA), which is a key component of brain cells (Charumas et al., 2013). "Fishes are common form of food for people as they can be found anywhere and are rich sources of protein and minerals. Continuous population growth and awareness of the benefits of fish consumption increase the demand for fishes." (Claret, Guerrero, Ginés, Grau, Hernández, Aguirre, Peleteiro, Fernández-Pato, & Rodríguez-Rodríguez, 2014; Tomic, Lucevic, Tomljanovic & Matulic, 2017). Moreover, the Food and Agriculture Organization of the United Nations reported that the growth of the fishing sector contributed to the increase in national income in Southeast Asian countries by more than 1%, namely Philippines (2.9%), Vietnam (4.7%) and Thailand (2.8%) (FAO, 2014). This showed that, presently, Indo-Pacific mackerels are valuable aquatic animal and have great economic importance.

Currently, it was found that less quantity of mackerels could be caught. From the statistics of Indo-Pacific mackerel quantity at Fishing Port, Mueang District, Samut Sakhon Province, it was found that the amount has been significantly declined during 2010-2015. The reduction rate tended to be accelerated. The quantity of Indo-Pacific mackerels harvested in 2014 of 31,436 tons, worth 1,189,223 million baht, decreased to only 13,803 tons, worth 541,356 million baht in 2015, or decreased by 61% from the quantity of mackerels measured at Fishing Port, Mueang District, Samut Sakhon Province (statistics on the quantity and value of aquatic animals at saltwater fish ports during 2010-2015, Department of Fisheries, Ministry of Agriculture and Cooperatives).

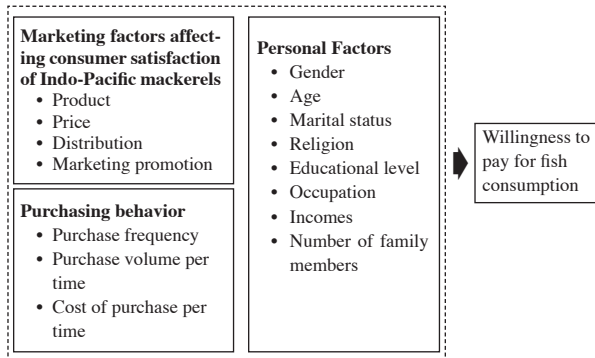
After comparison of prices of Indo-Pacific mackerels from the past to the present, it was found that the steamed mackerel price was 15 baht per bamboo basket in 2002 and 20 baht per bamboo basket in 2018, while fresh mackerel price was 90 baht per kilogram in 2010 and 100 baht per kilogram in 2018 (product price statistics for the year 2002-2018, Department of Internal

Trade, Ministry of Commerce). It can be observed that prices of both types of mackerels have been increased at decelerating rate in contrast to the quantity of Indo-Pacific mackerel being caught annually, which depleted in larger proportion. In practice, these changes are not under the control of agricultural sector, but strategies can be formulated to manage the changes in order to allow all sectors in society, producers, consumers and natural resources to survive under the changing circumstances and consumer behaviors. Therefore, modern agriculturist must learn requirements of consumers in order to gain as much market share as possible (Viwat & Monrueedee, 2014). Most of studies in the past, would focus on the study of biological aspects of Indo-Pacific mackerels, including variations in size structure and dynamics of Indo-Pacific mackerel populations such as growth rates, mortality rates, breeding and reproduction. The studies also gave suggestions on approaches to reserve resources and control utilization of mackerels, such as to regulate fishing activities and net mesh size (Dudley & Brothers, 1992), and other fisheries-related data to determine preliminary management policies. Nonetheless, there are few researches on mackerel marketing aspects. Therefore, the study of marketing factors and personal factors affecting mackerel consumption behavior in Samut Sakhon Province would allow us to understand factors influencing the consumption behavior of mackerels. This will be beneficial to fishermen and entrepreneurs in Indo-Pacific mackerel industry. Moreover, the government sector can also apply the results of this study to initiate marketing plan and management of Indo-Pacific mackerel resources and marine resources in the future.

Objectives

To study the factors affecting decision to purchase Indo-Pacific mackerels in Samut Sakhon province based on demand factors of Indo-Pacific mackerels related to consumer behaviors and willingness to pay for mackerels in order to obtain basic personal information, mackerel buying behavior, level of consumer satisfaction of mackerels and factors affecting consumer's willingness to pay for mackerels.

Conceptual framework



Research methodology

This research is a survey-based research. The sample group consisted of general consumers who purchased Indo-Pacific mackerels in Ban Phaeo District, Krathum Baen District, and Mueang Samut Sakhon District, Samut Sakhon Province. As the population size was large and the exact number was unknown, the researcher therefore used infinite population criteria to determine the sample size. The tolerance was determined at the 0.05 level. The sample size was calculated using Cochran (1977). The sample group (n) equaled to 384. Nonetheless, in order to prevent errors due to consumers giving incomplete answers, the sample size used in the actual study was 400. The sample consumers were selected by purposive sampling and interviews were conducted with 400 consumers, which were selected from 5 locations that sell Indo-Pacific mackerels in Samut Sakhon Province, namely fresh markets, community markets, fish markets, provincial annual fairs and around the hawker stalls. Data collection was done by interviewing samples during October 2018-September 2019. The research tool was questionnaires with open-ended questions and closed-ended questions and consisted of the following questions: (1) basic personal information and mackerel purchasing behavior of consumers, (2) marketing factors affecting the consumption of mackerels, (3) willingness to pay per consumption of mackerels.

Data analysis for each research objective (1) Basic personal information and Indo-Pacific mackerel purchasing behavior of consumers adopted descriptive statistics, namely percentage, mean, and standard deviation. (2) Marketing factors affecting the consumption of Indo-Pacific mackerels adopted level of consumer satisfaction based on Likert's Scale scoring method. The

questions were scaled on five levels: 5, 4, 3, 2 and 1. The criteria could be interpreted as follows: 4.21-5.00 mean highest satisfaction, 3.41-4.20 mean high satisfaction, 2.61-3.40 mean moderately satisfaction, 1.81-2.60 mean low satisfaction, and 1.00-1.80 mean least satisfaction, respectively. (3) Willingness to pay per consumption of Indo-Pacific mackerels adopted inferential statistics, namely multiple regression, stepwise elimination to analyze the factors affecting the decision to purchase mackerels in Samut Sakhon Province according to the following model:

Multiple regression analysis of factors affecting decision making for purchasing Indo-Pacific mackerel

The analysis of factors affecting the decision to buy fresh mackerel can be simulated as following:

$$Wtp = \alpha + \beta_1 SEX_i + \beta_2 AGE_i + \beta_3 EDU_i + \beta_4 OCP_i + \beta_5 STA_i + \beta_6 REL_i + \beta_7 MEM_i + \beta_8 INP_i + \beta_9 INH_i + \beta_{10} Qua_i + \beta_{11} EXP_i + \beta_{12} FRE_i + \beta_{13} PD_i + \beta_{14} PR_i + \beta_{15} PL_i + \beta_{16} PM_i + \varepsilon_i$$

Whereas:

Wtp	means	value of willingness to pay for mackerel consumption
α	means	constant value
β	means	coefficient of parameter estimates
ε	means	deviation
SEX	means	gender dummy variable, male equal to 1 and female equal to 0
AGE	means	Age (years old)
MEM	means	number of household members (persons)
INP	means	average personal income/month (1,000 baht)
INH	means	average household income/month (1,000 baht)

Dummy variable on education

EDU _{Un}	means	uneducated equal to 1 and other educational level equal to 0,
EDU _{Pri}	means	elementary level equal to 1 and other educational level equal to 0,
EDU _{Sec}	means	secondary level equal to 1 and other educational level equal to 0,
EDU _{cer}	means	vocational/high vocational level equal to 1 and other educational level equal to 0,
EDU _{Bac}	means	bachelor's degree level equal to 1 and other educational level equal to 0,

EDU_{Mas} means master's degree level equal to 1 and other educational level equal to 0,

Dummy variable on occupation

OCP_{Pe} means private company employee equal to 1 and other occupation equal to 0,

OCP_{Hi} means independent contractor equal to 1 and other occupation equal to 0,

OCP_{Bo} means own business equal to 1 and other occupation equal to 0,

OCP_{Hw} means housewife equal to 1 and other occupation equal to 0,

OCP_{Se} means state enterprise employee equal to 1 and other occupation equal to 0,

OCP_{Of} means civil servant equal to 1 and other occupation equal to 0,

Dummy variable on marital status

STA means dummy variables on marital status by specifying

STA_{Sin} means single equal to 1 and other marital status equal to 0,

STA_{Mar} means married equal to 1 and other marital status equal to 0,

Dummy variable on religion

REL_{Bud} means Buddhism equal to 1 and other religion equal to 0,

REL_{Chr} means Christianity equal to 1 and other religion equal to 0,

Variable on Purchasing behavior

QUA means purchase volume per time (kg, bamboo basket)

EXP means purchase amount per time (Baht)

FRE means purchase frequency per month (times)

Variable on Marketing factors

PD means product satisfaction rating scale consists of 6 sub-items

PR means price satisfaction rating scale consists of 6 sub-items

PL means distribution channel satisfaction rating consists of 7 sub-items

PM means promote marketing rating scale consists of 6 sub-items

Results

1. Characteristics of respondents

1.1 Basic personal information and Indo-Pacific mackerel purchasing behavior of consumers

Most of the respondents were female, aged between 18-35 years old, married, Buddhism, and

graduated in Bachelor's degree. Their occupations were private company employee and have income less than 25,000 baht. The research results were consistent with (Jarupa, 2008) which conducted study on marketing factors affecting the consumers' decisions to purchase Surimi processed seafood in Bangkok. The study found that most of the consumers in the sample group were female, aged between 26-33 years, graduated in Bachelor's degree, and worked as private company employees, with incomes between 15,001-20,000 baht. The study on consumers' purchasing behaviors of steamed mackerels in Mueang District, Chiang Mai Province, indicated that most consumers were female and married (Theerawat, 2007). The study results showed that most consumers prefer to purchase steamed mackerel 3-4 times per month and fresh mackerel 1-2 times per month. It was because steamed mackerels were sold in small quantities and could be bought at 2-3 mackerels per bamboo basket. Nonetheless, fresh mackerels were sold in kilograms which would consist of larger quantity. Thus, the purchase frequency would be lesser. Consumers preferred to purchase mackerels with smaller size. It was because consumers believe that small-sized mackerels are Thai mackerels and would be more delicious. Most of them would buy steamed mackerel for no more than 1-2 bamboo baskets at a time. The research's findings were aligned with Teerawat (2007) which studied the number of steamed mackerels purchased by consumers each time. For steamed mackerel, most consumers would purchase 1-2 mackerels per time. Most consumers in Mueang District, Chiang Mai Province, would buy fresh mackerels of no more than 2 kg at a time. The sample size could purchase mackerels conveniently because they were close to the mackerel distribution area. There was no need to buy mackerel in large quantity to keep in stock. The purpose of buying mackerels was for personal consumption, therefore they preferred to bought in a small quantity. From the observation, the researcher found that consumers would choose to purchase mackerels during 12.30-13.30 hrs. and 16.00-17.30 hrs. because data of large number of respondents were collected during the periods. In addition, the periods are convenient time because most of consumers would have free time during lunch breaks and after work in the evening. Meanwhile, on Saturday - Sunday and public holidays, most consumers would purchase mackerels between 9:00 -14.00 hrs. Nonetheless, seafood dealers would purchase mackerels before the aforementioned times. Family member was the person who had the

greatest influence on the purchasing decision of the sample group. Type of mackerels that most consumers preferred was steamed mackerels because their prices were cheaper than other seafood and could be preserved in refrigerator for many days. Mackerels could be prepared in several types of dishes easily. Mackerels have unique flavors. The average costs to buy steamed mackerels were less than 100 baht per time. The average costs to fresh steamed mackerels were mostly less than 200 baht per time. Substitutes in cases consumers could not afford to buy steamed mackerel were mostly catfish and tilapia. For fresh mackerels, consumers will buy snakehead fish and small seabass in case they could not find fresh mackerels because the prices were close to fresh mackerels. The fishes could substitute mackerels in cooking menu and were easy to buy. Alternatively, consumers may change food menu if they could not find mackerel. The most common problem in purchasing mackerels encountered by consumers was too few mackerel stores (26.25 percent). Meanwhile, 54.25 percent of consumers did not encounter any problems when buying mackerels. Most consumers, 73.75 percent, were willing to pay for mackerel even if mackerel prices increase in the future.

1.2 Level of consumers' satisfactions toward Indo-Pacific mackerels in Samut Sakhon Province

Consumers' satisfactions toward Indo-Pacific mackerels in Samut Sakhon Province were affected by the following factors:

1) Product factor

In an overall, product factor has the highest influence on the decision to purchase steamed mackerels of the sample group who preferred to consume steamed mackerels, with an average score of 4.22, which was the highest score. When considering in details, it was found that the sample group bought steamed mackerels based on the image and reputation of mackerel tastes of Samut Sakhon Province (average score of 4.52), followed by cleanliness of the mackerel (average score of 4.40), nutritional benefits (average score of 4.35), freshness of the mackerel (average score of 4.21) which were in the highest level of consumer satisfaction, variety of mackerel products such as fresh mackerels, steamed mackerels and various processed mackerels (average score of 4.06) and packaging of mackerels that are convenient for transportation (has the least average score of 3.76), which were at a high level of consumer satisfaction, respectively. Products have the highest influence over consumers' decision to purchase

mackerels.

Similarly, product factor also has the highest influence on the decision to purchase fresh mackerels of the sample group who preferred to consume fresh mackerels, with an average score of 4.27, which was the highest score. When considering in details, it was found that the sample group bought fresh mackerels based on the image and reputation of mackerel tastes of Samut Sakhon Province (average score of 4.57), followed by cleanliness of the mackerel (average score of 4.50), freshness of the mackerel (average score of 4.39), nutritional benefits (average score of 4.29), which were in the highest level of consumer satisfaction, variety of mackerel products such as fresh mackerels, steamed mackerels and various processed mackerels (average score of 4.10), and packaging of mackerels that are convenient for transportation (has the least average score of 3.74), which were at a high level of consumer satisfaction, respectively.

When considered each item, the item with the highest average score was image and reputation of the mackerels from Samut Sakhon Province. It was because whenever consumers wanted to buy mackerels from the central region, they will think of mackerels in Samut Sakhon. The item with the second highest scores was quality and freshness. Mackerel consumers place great emphasis on quality and freshness. Results of study conducted by Batsios, Angelidis, Moutopoulos, Anastasiadou, & Chrisopolitou (2003) on Consumer Attitude Towards Shellfish in The Greek Market: A Pilot Study, indicated that most of the respondents (94.3%) consider freshness as a very important factor. As Samut Sakhon is located near the Gulf of Thailand, consumers would come to buy seafood in the province because of freshness of the seafood product. In addition, the prices of mackerels in Samut Sakhon province were relatively lower than other provinces. Nonetheless, the prices were only slightly lower than other places, which was unexpected as the researcher initially thought that the selling price should be much lower than that of mackerels distributed outside Samut Sakhon. However, consumers still opined that the prices were reasonable when comparing with the quality and reputation of mackerels in Samut Sakhon province. Mackerels from Samut Sakhon are fresh because of its proximity to the Gulf of Thailand and would maintain their freshness after being purchased by consumers. This is consistent with study of (Chavalit et al., 2018) on marketing mix factors for consumers' decision to purchase seafood in

Mahachai Market, Samut Sakhon Province. The study results indicated that majority of consumers choose to purchase seafood at Mahachai market because of product quality/freshness. As Mahachai Market is located near the Gulf of Thailand, consumers would come to buy seafood in the province because of their freshness. Subsequently, consumers place emphasis on nutritional value. Mackerels are saltwater fish with high nutritional value and are cheaper than other types of fish. Consumers also consider other factors namely hygiene, variety of mackerel products and packaging. Supat, Pattana, & Chalermphon (2017) studied factors affecting decision to purchase durians in Eastern Thailand: consumer case studies. The sample group of consumers decided to buy durian produced in eastern Thailand are Chanthaburi, Rayong and Trat provinces. Most of the samples were focused on with the most product marketing factors. Consumers will consider the quality of durian first before making a purchase decision.

2) Price factor

In an overall, price factor has high effect on the decision to purchase steamed mackerels of the sample group who preferred to consume steamed mackerels, with an average score of 3.94 which was at a high level. When considering in details, it was found that the sample group bought steamed mackerel by considering the most reasonable prices for the quantity of mackerel with average score of 4.43 which was the highest level. This followed by the most reasonable prices for the quality of the mackerels with average score of 4.31 which was the highest level, presentation of clear and accurate price tags for mackerels with average score of 3.99 which was at high level, stable prices of mackerels with average score of 3.66 which was at a high level, mackerels have many price levels to choose from with average score of 3.75 which was at high level and advance notice of changing the prices of mackerels had the least average score of 3.54, which was at high level, respectively.

Similarly, price factor also has the high effect on the decision to purchase fresh mackerels of the sample group who preferred to consume fresh mackerel, with an average score of 3.92 which was at high level. When considering in details, it was found that the sample group bought fresh mackerel by equally considering the most reasonable prices for the quantity of mackerel and the most reasonable prices for the quality of the mackerels with equal average scores of 4.38 which was the highest level. This followed by presentation of clear

and accurate price tags for mackerels with average score of 3.98 which was at high level, mackerels have many price levels to choose from with average score of 3.75 which was at high level, stable prices of mackerels with average score of 3.60 which was at high level and advance notice of changing the prices of mackerels had the least average score of 3.45 points, which was at high level, respectively.

Price factor: Consumers also give particular attention on the price factor. The prices of mackerels should be reasonable with the quantity and quality. These aspects are important consideration factors of consumers as well. Moreover, consumers expect that when they purchase products near the production source, the products should have good quality with low prices. These findings were consistent with marketing mix theory of Kotler (Kotler, 1997) quoted by (Jarupa, 2008), which stated that "Consumers will consider price as part of the evaluation of the quality and value of the products that are expected to be received." and marketing mix theory of Etzel Walker and Stanton (Etzel, Walker, & Stanton, 2001) quoted by (Thitapa, 2012) which stated that "Consumers would compare the value of a product to its price. If the product is of higher quality than the price, the consumer will make a decision to buy the product." In addition, the products have clear labels. There are several price levels to choose from. Mackerels are available in various price ranges. The prices of mackerels tend to have small degree of fluctuation and are subject to advance notice if there is any price change. Consumers place great emphasis on the price factor.

3) Place Factor

In an overall, place factor has high effect on the decision to purchase steamed mackerels of the sample group who preferred to consume steamed mackerels, with an average score of 3.75 which was at high level. When considering in details, it was found that the sample group bought steamed mackerel based on accessibility of the place that sells mackerels with average score of 4.43 which was the highest level, followed by the cleanliness of the place with an average score of 4.16 which was at high level, availability of convenient parking spaces with average score of 3.99 which was at high level, variety of mackerel selling shops to choose from with average score of 3.91, which was at high level, offering of mackerel delivery service to customers with an average score of 3.65 which was at high level, the place to buy mackerel is in an air-conditioned room with an average score of 3.48 which

was at high level, and products can be purchased via website or various internet channels had the least average score of 2.71 which was at moderate level, respectively.

Similarly, place factor also has the high effect on the decision to purchase fresh mackerels of the sample group who preferred to consume fresh mackerels, with an average score of 3.70 which was at a high level. When considering in details, it was found that the sample group bought fresh mackerels based on accessibility of the place that sells mackerel with average score of 4.28 which was the highest level, followed by the cleanliness of the place with an average score of 4.07 which was at high level, availability of convenient parking spaces with average score of 4.04 which was at high level, variety of mackerel selling shops to choose from with average score of 3.88, which was at high level, the place to buy mackerel is in an air-conditioned room with an average score of 3.58 which was at high level, offering of mackerel delivery service to customers with an average score of 3.39 which was at moderate level, and products can be purchased via website or various internet channels had the least average score of 2.68 which was at moderate level, respectively.

The study showed that consumers place high importance on distribution location when purchasing mackerels. When considered each item, the items with the highest average score were availability of convenient parking spaces and accessibility. In addition, consumers also place emphasis on the cleanliness of the distribution place of mackerels because mackerels are edible products. The results were consistent with the research results of (Batsios, Angelidis, Moutopoulos, Anastasiadou, & Chrisopolitou, 2003) which indicated that 67.2% of respondents consider the hygienic conditions of the fish stores were very important criteria. The item with the second highest scores was sufficient parking space as most consumers travel by cars and motorbikes and require spaces to park their vehicles when purchasing the products. The distribution locations offer variety of mackerel products and delivery services. Moreover, consumers also gave high consideration whether the distribution locations have air conditioning system when purchasing the products. Meanwhile, consumers gave moderate consideration whether the store offer online services or allow them to order mackerels via website or Internet. This was because mackerels were fresh products. Consumers may be more confident in the quality if they come to buy the product by themselves. As most of the respondents live in Samut Sakhon

Province which was close to the source of distribution, consumers gave only moderate attention on this factor.

4) Marketing Promotion Factor

In an overall, marketing promotion factor has high effect on the decision to purchase steamed mackerels of the sample group who preferred to consume steamed mackerels, with an average score of 3.57 which was at a high level. When considering in details, it was found that the sample group chose to buy steamed mackerel based on hospitability and services of mackerel sellers with an average score of 3.90 which was at high level. This followed by the seller's recommendations to buy mackerel with average score of 3.81 which was at high level, discounted mackerel prices for regular customers with average score of 3.55 which was at high level, sales promotion during festivals with average score of 3.45 which was at high level, offering of premiums when buying large quantities of mackerels with average score of 3.42 which was at high level, and skill of the mackerel seller in decorating the product had the least average score of 3.27 which was at moderate level, respectively.

Similarly, marketing promotion factor also has the high effect on the decision to purchase fresh mackerels of the sample group who preferred to consume fresh mackerels, with an average score of 3.82 which was at a high level. When considering in details, it was found that the sample group chose to buy steamed mackerel based on hospitability and services of mackerel sellers with an average score of 4.09 which was at high level. This followed by the seller's recommendations to buy mackerel with average score of 4.02 which was at high level, sales promotion during festivals with average score of 3.81 which was at high level, discounted mackerel prices for regular customers with average score of 3.80 which was at high level, offering of premiums when buying large quantities of mackerels with average score of 3.73 which was at high level, and skill of the mackerel seller in decorating the product had the least average score of 3.49 which was at moderate level, respectively.

The study results showed that the sample group place importance of marketing promotion at a high level, especially hospitality service of mackerel sellers and recommendations to purchase mackerel. The item was rated as the top priority in the marketing promotion category by consumers. It was because consumers were unable to evaluate quality and freshness of the products based on only visual observation

of the products being nicely displayed in the stores. In addition, consumers do not have sufficient knowledge and experience to choose the best quality products. Therefore, they have to rely on information and recommendations of the sellers when buying products in order to gain confidence in the repurchase of the products. Furthermore, consumers also pay attention to discount on mackerel prices for regular customers, sales promotion during the festival and premium when buying mackerels in large quantities. As most consumers in the

sample group have low to medium incomes, they will not decide to purchase the product immediately but will consider the price and value before making a decision. Discounts and premium may meet the needs of mackerel consumers. Meanwhile, consumers gave moderate emphasis on expertise of the sellers in cutting mackerels as consumers have to re-prepare steamed mackerels and fresh mackerels again when they take the products back to their home. Therefore, they do not pay attention to the cutting of mackerels.

Table 1 Mean and standard deviation of marketing factors affecting selection of steamed mackerels and fresh mackerels of the sample group (n = 400)

Various Factors	Steamed Mackerels			Fresh Mackerels		
	Average	Standard Deviation	Interpretation	Average	Standard Deviation	Interpretation
Product	4.22	0.462	Highest	4.27	0.417	Highest
1. Image and reputation of the mackerels from Samut Sakhon	4.52	0.746	Highest	4.57	0.497	Highest
2. Variety of mackerel products, such as fresh mackerels, steamed mackerels and various types of processed mackerels	4.06	0.704	High	4.10	0.705	High
3. Cleanliness of mackerels	4.40	0.724	Highest	4.50	0.502	Highest
4. Packaging of mackerels that are convenient for transportation	3.76	0.803	High	3.74	0.706	High
5. Freshness of mackerels	4.21	0.695	Highest	4.39	0.706	Highest
6. Nutritional benefits	4.35	0.706	Highest	4.29	0.620	Highest
Price	3.94	0.764	High	3.92	0.603	High
7. Clear and accurate price tags for mackerels	3.99	0.904	High	3.98	0.684	High
8. Mackerels have many price levels to choose from	3.75	0.895	High	3.75	0.800	High
9. Advance notice of changing the prices of mackerels	3.54	1.091	High	3.45	0.828	High
10. Prices are reasonable for the quality of mackerels	4.31	0.834	Highest	4.38	0.840	Highest
11. Prices are reasonable for the quantity of mackerels	4.43	0.743	Highest	4.38	0.692	Highest
12. Stable prices of mackerels	3.66	1.032	High	3.60	0.718	High
Place	3.75	0.560	High	3.70	0.680	High
13. Accessibility of the places that sell mackerel	4.43	0.805	Highest	4.28	0.921	Highest
14. Mackerel delivery service to customers	3.65	0.993	High	3.39	1.007	Moderate
15. Mackerel selling places are in an air-conditioned room	3.48	0.881	High	3.58	1.049	High
16. Availability of convenient parking spaces	3.99	0.896	High	4.04	0.902	High
17. Cleanliness of mackerel selling stores	4.16	0.922	Highest	4.07	0.985	High
18. Variety of mackerel selling stores to choose from	3.91	0.840	High	3.88	0.848	High
19. Products can be purchased via website or various internet channels	2.71	0.987	Moderate	2.68	0.930	Moderate
Promotion	3.57	0.741	High	3.82	0.658	High
20. Hospitality/service of mackerel sellers	3.90	0.811	High	4.09	0.696	High
21. Discount on mackerel prices for regular customers	3.55	0.948	High	3.80	0.916	High
22. Sales promotion during the festival	3.45	0.944	High	3.81	0.780	High
23. Premium when buying mackerels in large quantities	3.42	1.013	High	3.73	0.883	High
24. Expertise of the sellers in cutting mackerels	3.27	0.891	Moderate	3.49	1.037	High
25. Recommendation of sellers to buy mackerels	3.81	0.921	High	4.02	0.871	High

3. Factors affecting consumers' willingness to pay for Indo-Pacific mackerels

Before considering the multiple regression analysis, the suitability of the models, namely multicollinearity and correlation would be considered. It was found that the correlation value did not exceed 0.65 Burns & Grove, (1993) (cited in Supat, Pattana, & Chalermphon, 2017). It could be explained that all variables could be used as independent variables. It did not cause a linear relationship problem of independent variables. Moreover, it was also found that the Tolerance and Variance Inflation Factors (VIF) were found to be equal to 1. Thus, there was no Multicollinearity because $VIF < 10$ and $Tolerance > 0$. When considering autocorrelation from statistic of Durbin-Watson (D.W.), it was found that D.W. values were 1.973 (fresh mackerels) and 1.624 (steamed mackerels), which ranged from 1.5 to 2.5. This explained that the model did not have a correlation of variable error. Coefficient (r) means the relationship between independent variables and dependent variables. The results showed that 0.783 (fresh mackerels) and 0.789 (steamed mackerels) were equivalent to 78.3% (fresh mackerels) and 78.9 percent (steamed mackerels). This indicated that they have a good correlation and found that the Mean of Residual error is equal to 0.00 means the data is distributed asymmetrically. Heteroskedasticity, Coefficient of determination or R-squared (R^2) indicated that reliability of this model for prediction on the samples. The results were 0.613 (fresh mackerels) and 0.622 (steamed mackerels). It showed that the model could predict the willingness to pay for mackerel by 61.3 percent (fresh mackerels) and 62.2 percent (steamed mackerels).

Multiple regression analysis results with dummy variables were selected by adding independent variables by multiple linear regression analysis model with dummy variables by stepwise regression, it was found that there were 5 factors affecting the willingness to pay for fresh mackerels, namely personal average incomes, Buddhism, employee occupation, housewife occupation, civil service occupation. The average purchase volume of fresh mackerels per time can be described as follows.

3.1 Coefficient of the average personal income variable (INP) was 0.010, meaning that, if other factors were constant, when the average income increased by 1000 baht/month, the willingness to pay for fresh mackerels would increase by 10 baht per kg with

statistical significance at the 0.05 level. It was because consumers have higher incomes resulting in high purchasing power as well, in line with the study of Adul (1998) (Supat, 2017).

3.2 Coefficient of civil servant occupation variables (OCP_{of}) was 17.172, meaning that, if other factors were constant, if the sample groups were civil servants, they would be willing to pay an increase of 17.172 baht per kilogram for fresh mackerels. The findings were consistent with the study of Methee, Sommai, Polphisil, Pailin, Teeraphong, Rattanawadee, Warah, TWarrantat, & Soranat Sirisuay (2017) which found that the sample group working in the civil service had an increase in the willingness to pay for fresh pufferfish meat consumption.

3.3 Coefficient of Buddhism variables (REL_{Bud}) was 19.101, meaning that, if other factors were constant, if the samples were Buddhist, they would be willing to pay an increase of 19.101 baht per kilogram for fresh mackerels.

3.4 Coefficient of behavioral variables for average quantity of mackerel purchase per time (QUA) was 12.051, meaning that, if other factors were constant, when consumers bought fresh mackerels with average quantity higher by 1 kg, they would be willing to pay an increase of 12.051 baht per kilogram for fresh mackerels. The study of Phusuda (2018) stated that factors influencing consumers' willingness to pay for riceberry in restaurants in Bangkok and expenditure on food consumption outside the home per day would likely to be increased to pay extra for riceberry consumption was higher than other samples.

3.5 Coefficient of housewife occupation variables (OCP_{Hw}) was -28.764, meaning that, if other factors were constant, if the sample groups were housewife, they would be willing to pay a decrease of 28.764 baht per kilogram for fresh mackerels.

3.6 Coefficient of independent contractor occupation variables (OCP_{Hi}) was -32.211, meaning that, if other factors were constant, if the sample groups were independent contractors, they would be willing to pay a decrease of 32.211 baht per kilogram for fresh mackerels.

Factors affecting willingness to pay for steamed mackerels consisted of three factors, namely male gender, bachelor's degree and average personal income which can be described as following

1. Coefficient of bachelor's degree variables (Bac) was 6.543, meaning that, if other factors were

Table 2 Statistic t-value coefficients on Willingness to Pay for Fresh mackerel as a dependent variable

Constant term	Coefficients	Std. Error	t-value	Prob.
	108.251	0.805	3.434	0.000
OCP _H	-32.211	0.610	-5.275	0.000
OCP _{Hw}	-28.764	0.592	-4.851	0.000
REL _{Bud}	19.101	0.583	3.276	0.001
QUA	12.051	3.327	3.623	0.000
OCP _{Of}	17.172	0.692	2.479	0.015
INP	0.001	0.000	3.981	0.000

R² = 0.613 F-statistics = 31.203 D.W. = 1.973

constant, when the price satisfaction score level increased by 1 point, the consumers would be willing to pay an increase of 6.543 baht per bamboo basket for steamed mackerels with statistical significance of 0.01.

2. The coefficient of the average personal income variable (INP) was 0.001, meaning that, if other factors were constant, when the average income increased by 1000 baht/month, the willingness to pay for steamed mackerels would increase by 1 baht per bamboo basket with statistical significance at the 0.05 level.

3. Coefficient of the male variables (SEX_M) was 5.543, meaning that, if other factors were constant, if the samples were male, they would be willing to pay an increase of 5.543 baht per bamboo basket for steamed mackerels.

Table 3 Statistic t-value coefficients on Willingness to Pay for steamed mackerel as a dependent variable

	Coefficients	Std. Error	t-value	Prob.
Constant term	13.905	1.868	7.444	0.000
SEX _{Male}	5.584	1.985	2.795	0.006
INP	0.001	0.010	9.798	0.000
EDU _{Bac}	6.543	1.755	3.729	0.000

R² = 0.622 F-statistics = 48.636 D.W. = 1.624

The results of study on factors affecting decision to purchase Indo-Pacific mackerels, Samut Sakhon Province: Consumer Case Study could be summarized that the sample group consisted of 400 respondents. Most of them were female, aged between 18-35 years old, graduated with bachelor's degree, worked as private company employee, married and is a Buddhist. Most of them have 2-3 family members and have income less than 25,000 baht. Most consumers preferred to purchase steamed mackerel 3-4 times per month and fresh mackerel 1-2 times per month. Consumers preferred to purchase mackerels with smaller size. Most of them would buy steamed

mackerel for no more than 1-2 bamboo baskets at a time. The average purchasing costs for steamed mackerels were less than 100 baht per time. The average purchasing costs for fresh steamed mackerels were mostly less than 200 baht per time. Substitutes in cases consumers could not afford to buy steamed mackerel were mostly catfish and tilapia. For fresh mackerels, consumers will buy snakehead fish and small seabass in case they could not find fresh mackerels. The most common problem in purchasing Indo-Pacific mackerels encountered by consumers was too few mackerel stores (26.25 percent). Meanwhile, 54.25 percent of consumers did not encounter any problems when buying mackerels. Regarding marketing factor, it was found that recognitions on tastes of Indo-Pacific mackerels from Samut Sakhon Province was the most influential factor for buyers to purchase Indo-Pacific mackerels. Most consumers, 73.75 percent, were willing to pay for mackerel even if mackerel prices increase in the future. Consumers were willing to pay an increase of 6.543 baht/bamboo basket for steamed mackerels. In addition, consumers were willing to pay an increase of 19.101 baht/kilogram for fresh mackerels. Factors, including gender, personal incomes, religion (Buddhism), occupation (civil service) of the sample group, have positive correlation with willingness to pay for increased prices at statistical significance level of $\alpha = 0.01$.

Discussion

Results of the study on number of willing consumers and value of consumers' willingness to pay for Indo-Pacific mackerel consumption clearly showed that Indo-Pacific mackerels can add value and have potential to grow in demand in Thailand. Therefore, fishermen, producers, middlemen and other stakeholders including related organizations such as Fish Marketing Organization should jointly develop action plans regarding the production, inventory management, marketing strategy and other aspects to utilize mackerel resources and the market value of mackerel that will eventually increase. The strategy that should be used is to educate consumers to realize benefits of Indo-Pacific mackerel as well as giving consumers an opportunity to experience consumption of Thai mackerels. This would stimulate consumers' decisions to purchase mackerels with positive attitude and not only perceiving that mackerels are food but are valuable natural resource that should be preserved. Promotional activities may be conducted under cooperation with the Department of

Fisheries, Department of Marine and Coastal Resources, Ministry of Natural Resources and Environment. The study of Consumers' Willingness to Pay for Sustainable Seafood Made in Europe (Zander & Feucht, 2018) indicates that good communication to educate consumers on the benefits that they will receive and the welfare of animals, including the importance of environmental sustainability will increase consumers' willingness to pay higher prices. Communication must emphasize on consumer benefits and conservation values in order to differentiate sustainable production from conventional production standards. Government and private agencies such as the Ministry of Commerce and Department of Internal Trade should organize mackerels trade fairs to educate consumers and stimulate consumption of Thai mackerels. These initiations will influence consumers to make purchase decisions and recognize unique value of Thai mackerels as well as support fishermen and ensure that Thai mackerel industry would be maintained sustainably. In addition, mackerels can be sold at higher prices to reflect the actual value and costs under standard label which guarantee quality and source of Indo-Pacific mackerel production. From the study of the market factors, image and reputation of Indo-Pacific mackerel tastes of Samut Sakhon Province was the most influential factor for buyers to purchase Indo-Pacific mackerels. Therefore, concrete label should be developed, which requires cooperation from government and private agencies, including standard creation related parties. Label standards would provide certification of specified origins, features and physical characteristics of Indo-Pacific mackerels. The study on Factors Affecting the Market Price of Fish in the Northern Part of Surigao Del Sur, Philippines Alapan. (Alapan, Arpilleda, Altizo, Frias, Ravelo, & Cuartero (2016) found that fish quality had an effect on the price structure of fish. Consumers were willing to pay for good quality fish. Certification from a reliable standard assessment source will increase consumer confidence when making the purchase. Providing knowledge on and proper utilization of Indo-Pacific mackerel resources are essential to enhance value of the resources. Important features of Indo-Pacific mackerels are sometimes overlooked by some consumers. Therefore, advertisements and public relations should be implemented to provide information on unique characteristics and tastes of Indo-Pacific mackerel that are different from other species of mackerel and distinctive production sources to allow consumers to perceive value and consume Thai

mackerels. The study found that females are more likely to be responsible for purchasing consumer goods and household consumption. However, female consumers are less likely to be willing to pay more for Indo-Pacific mackerels than males. Therefore, if the prices of mackerel increase in the future or adjust slightly, more mackerels would be imported from overseas. This situation should be prevented from occurring in the Thai fishing sector.

The problems of depleting Indo-Pacific mackerel resources can be solved by closing the bay and control of fishing tools. The Department of Fisheries has announced measures to manage aquatic resources during the spawning, spawning season and raising of young fish in the Gulf of Thailand or announcing the annual bay closure between February and May every year. Certain types of fishing gear that may affect the propagation of spawning and larvae in the Gulf of Thailand, especially Indo-Pacific mackerels, which are valuable and economically important aquatic animal of the country, were prohibited. Violation of these measures are subject to rigorous arrestment and prosecution. These measures aimed to control the supply of marine resources. Therefore, knowledge of the value of mackerels should be disseminated for campaigning proper and appropriate utilization of Indo-Pacific mackerel resources. Consumers should be educated on sustainable seafood consumption, purchase eco-friendly seafood, recognizing the importance of the marine environment through environmental label in order to improve consumer attitudes towards the marine environment (Winson, Choi, Hunter, & Ramsundar, 2022). As a result, the findings can be used to develop tangible consumer marketing strategy. Based on number of willing consumers and value of consumers' willingness to pay for mackerels, the research results evidently indicated that Thai mackerels can add value and are products that have potential to grow in Thailand. Therefore, fishermen, manufacturers, middlemen, stakeholders and related organizations should jointly develop plans related to production, inventory management, marketing strategies, etc. The strategies that should be adopted are to raise consumers' awareness on benefits of Thai mackerels and unique production source which enable mackerels to have outstanding tastes as well as allow consumers to have opportunity to experience in consumption of Thai mackerels. This will stimulate consumers to make purchase decisions for Thai mackerels with a positive attitude and not perceiving mackerels as merely food but

to think of Thai mackerels as unique natural resources that should be preserved. In order to achieve effective fishery resource management concepts, all the sector including people, communities, stakeholders and the government should jointly determine management approaches and develop policies in line with development of fishery resource management in the future

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