

## Influential Factors to the Export of Thai Chilled and Frozen Fresh Shrimps to the U.S.A.

### ปัจจัยที่มีอิทธิพลต่อการส่งออกกุ้งสดแช่เย็นแช่แข็งของไทย ไปยังประเทศสหรัฐอเมริกา

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#### Abstract

This study aims at examining export of Thai chilled and frozen fresh shrimps to the U.S.A. by focusing on current situation and influential factors of the export. Quarterly secondary data in time series from the first quarter of 1999 to the fourth quarter of 2010, the total of 48 quarters, are used in the multiple regression model for descriptive and quantitative analyses. Independent variables tested are export prices of Thai chilled and frozen shrimps (PRI), production of Thai chilled and frozen shrimps (PRO), baht per U.S. dollar exchange rate (EXC), the U.S. consumer price index (CPI), and the U.S. national income (NI).

The result of the study shows that the U.S.A. is the number 1 export market for Thai shrimps, as Thailand possesses 45 percent of the U.S.A. shrimp product market. The second most important markets are Japan and the European Union. For the analysis of influential factors

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to the export of Thai chilled and frozen fresh shrimps to the U.S.A., the following equation is obtained:

$$\text{Export} = 6230.837 - 0.008\text{PRI} + 0.175\text{PRO} + 22.090\text{EXC} - 19.924\text{CPI} + 0.105\text{NI}$$

The equation suggests that export prices of Thai chilled and frozen shrimps (PRI) and the U.S. consumer price index (CPI) have negative relationship with quantity of the export (Export), i.e., if PRI and CPI increase, Export will decline. However, other three variables give the opposite result. Production of Thai chilled and frozen shrimps (PRO), baht per U.S. dollar exchange rate (EXC), and the U.S. national income (NI) have positive relationship with quantity of the export (Export), i.e., if PRO, EXC, and NI increase, Export will also increase. However, this study finds that only the variable PRO has a statistically significant impact on the export of Thai chilled and frozen shrimps to the U.S.A.

**Keywords:** Shrimp Export, Chilled and Frozen Fresh Shrimps

## บทคัดย่อ

การศึกษานี้มีวัตถุประสงค์เพื่อศึกษาปัจจัยที่มีอิทธิพลต่อการส่งออกกุ้งสดแช่เย็นแช่แข็งของไทยไปยังประเทศสหรัฐอเมริกา ข้อมูลที่นำมาศึกษาเป็นข้อมูลทุติยภูมิแบบอนุกรมเวลา รายไตรมาส ตั้งแต่ไตรมาสที่ 1 พ.ศ. 2542 ถึง ไตรมาสที่ 4 พ.ศ. 2553 รวมทั้งสิ้น 48 ไตรมาส วิเคราะห์ข้อมูล โดยใช้สถิติการถดถอยเชิงพหุ ใช้วิธีการศึกษาทั้งเชิงพรรณนาและเชิงปริมาณ ตัวแปรปัจจัยที่มีอิทธิพลที่ทำการศึกษา ได้แก่ ราคาส่งออกกุ้งสดแช่เย็นแช่แข็งของไทย ปริมาณผลผลิตกุ้งสดแช่เย็นแช่แข็งของไทย อัตราแลกเปลี่ยนเงินบาทต่อดอลลาร์สหรัฐ ดัชนีราคาผู้บริโภคของประเทศสหรัฐอเมริกา และรายได้ประชาชาติของประเทศสหรัฐอเมริกา

ผลการศึกษาพบว่า ตลาดสหรัฐอเมริกา ถือเป็นตลาดส่งออกอันดับ 1 ของไทยโดยไทยสามารถครองส่วนแบ่งทางการตลาดสินค้ากุ้งได้สูงถึงร้อยละ 45 ส่วนตลาดที่สำคัญรองลงมา คือ ญี่ปุ่น และสหภาพยุโรป สำหรับการวิเคราะห์ความสัมพันธ์ของปัจจัยที่มีอิทธิพลต่อปริมาณการส่งออกกุ้งสดแช่เย็นแช่แข็งของไทยไปยังประเทศสหรัฐอเมริกา ได้สมการ

$$\text{Export} = 6230.837 - 0.008\text{PRI} + 0.175\text{PRO} + 22.090\text{EXC} - 19.924\text{CPI} + 0.105\text{NI}$$

จากสมการพบว่า ราคาส่งออกกุ้งสดแช่เย็นแช่แข็งของไทย และ ดัชนีราคาผู้บริโภคของประเทศสหรัฐอเมริกา มีความสัมพันธ์ในทิศทางตรงกันข้ามกับปริมาณการส่งออกกุ้งสดแช่เย็นแช่แข็งของไทย ซึ่งถ้าราคาส่งออกกุ้งสดแช่เย็นแช่แข็งของไทย และดัชนีราคาผู้บริโภคของประเทศสหรัฐอเมริกา เพิ่มขึ้น จะส่งผลให้ปริมาณการส่งออกกุ้งสดแช่เย็นแช่แข็งของไทยไปยังประเทศสหรัฐอเมริกา ลดลง ส่วนปริมาณผลผลิตกุ้งของไทย อัตราแลกเปลี่ยนเงินบาทต่อดอลลาร์สหรัฐฯ และรายได้ประชาชาติรวมของประเทศสหรัฐอเมริกา มีความสัมพันธ์ในทิศทางเดียวกันกับปริมาณการส่งออกกุ้งสดแช่เย็นแช่แข็งของไทย หมายความว่า ถ้าปริมาณผลผลิตกุ้งของไทยเพิ่มขึ้น อัตราแลกเปลี่ยนเงินบาทต่อดอลลาร์สหรัฐฯ อ่อนค่าลง และรายได้ประชาชาติรวมของประเทศสหรัฐอเมริกาสูงขึ้น จะส่งผลให้ปริมาณการส่งออกกุ้งสดแช่เย็นแช่แข็งของไทยไปยังประเทศสหรัฐอเมริกา เพิ่มขึ้นตามไปด้วย อย่างไรก็ตาม การศึกษานี้พบว่ามีเพียงตัวแปรปริมาณผลผลิตกุ้งของไทยเพียงตัวเดียวเท่านั้นที่มีอิทธิพลอย่างมีนัยสำคัญทางสถิติต่อการส่งออกกุ้งสดแช่เย็นแช่แข็งของไทยไปยังประเทศสหรัฐอเมริกา

**คำสำคัญ:** การส่งออกกุ้ง, กุ้งสดแช่เย็นแช่แข็ง

## Introduction

Chilled and frozen fresh shrimp is a fishery industry that plays a vital role in Thai economy. It continuously generates lucrative income for the country and Thailand is one of the largest chilled and frozen fresh shrimp exporters in the world. However, Thailand still faces many difficulties such as increasing of raw material prices, controlling of catching area in sea exclusive economic zone, and raising measures and standards of trading partners (Department of Fisheries, 2010). About 80 percent of total export of Thai chilled and frozen fresh shrimp goes to the United States. In 2010, the export to the United States reaches 103,053.33 tons or 24,201.08 million baht rising from 2009 by 11.89 percent in quantity and 15.27 percent in value (Thai Customs Department, 2011). This rising benefits from the infectious myonecrosis virus (IMNV) that block many competitor nations such as Indonesia, Mexico, Brazil, and China from the export and the oil spill problem in Gulf of Mexico in the second quarter of 2010 that cause many Americans temporarily refrain seafood from the area

Although competitor nations such as Vietnam, Indonesia, and India try to greatly increase their production of chilled and frozen fresh shrimps, customers are still appreciated and confident in quality of Thai products that come from high skilled farmers. In addition, Thai

government provides assistance on product inspection and quality warranty that in line with the world standard and takes care of the farmers' problems. These help strengthen customers' appreciation and confidence of Thai shrimps in the long run (Thai Frozen Foods Association, 2010).

The gradual economic recovery turns U.S. consumers to look more on seafood. This is good opportunity for Thailand to increase export of chilled and frozen fresh shrimps to the U.S.A. (Thai Trade Center, New York, 2011). To maintain potentiality of Thai chilled and frozen fresh shrimps to the U.S.A. market, the researchers, therefore, aim at investigating influential factors to the export of Thai chilled and frozen fresh shrimps to the U.S.A. We believe that the result of this research can be used for product development and competitive advantage formation as well as to continuously maintain Thailand's high market share of this product in the U.S.A. market.

### **Objectives of the Study**

- To study export situation of Thai chilled and frozen fresh shrimps to the U.S.A.
- To investigate influential factors to the export of Thai chilled and frozen fresh shrimps to the U.S.A.

### **Scope of the Study**

- Export data of quantity of Thai chilled and frozen fresh shrimps to the U.S.A. used in this study are quarterly time series secondary data starting from the first quarter of 1999 to the fourth quarter of 2010 with the total quarters of 48.
- From literature reviews, potential factors that can impact quantity of chilled and frozen fresh shrimps export to the U.S.A. are
  - Export prices of Thai chilled and frozen fresh shrimps
  - Production quantity of Thai chilled and frozen fresh shrimps
  - Exchange rate of Baht per U.S. dollar
  - Consumer Price Index of the U.S.A.
  - National Income of the U.S.A.

## Method

### Independent variables:

1. Export prices of Thai chilled and frozen fresh shrimps (Baht per ton)
2. Production quantity of Thai chilled and frozen fresh shrimps (tons)
3. Exchange rate of Baht per U.S. dollar
4. Consumer Price Index of the U.S.A.
5. National Income of the U.S.A. (dollars per person)

**Dependent variable** is export quantity of Thai chilled and frozen fresh shrimps to the U.S.A. (tons)

### Data

This research uses quarterly time series secondary data, 48 quarters in total, starting from the first quarter of 1999 to the fourth quarter of 2010.

### Data Analysis

- Descriptive analysis is used to analyze current situation of export of Thai chilled and frozen fresh shrimps to the U.S.A. as well as to examine problems of the export. Percentage and the average are the key tools for the analysis.

- Quantitative analysis is used to find influential factors to the export of Thai chilled and frozen fresh shrimps to the U.S.A. Multiple regression analysis is used as an analysis tool. The export equation to be tested is shown as

$$\text{Export}_i = \beta_0 + \beta_1 \text{PRI}_i + \beta_2 \text{PRO}_i + \beta_3 \text{EXC}_i + \beta_4 \text{CPI}_i + \beta_5 \text{NI}_i + \varepsilon$$

where,

$i$  = the  $i^{\text{th}}$  quarter starting from the first quarter of 1999 as  $i = 1$  to the fourth quarter of 2010 as  $i = 48$ .

$\text{Export}_i$  = quantity of export of Thai chilled and frozen fresh shrimps to the U.S.A. in the  $i^{\text{th}}$  quarter.

$\text{PRI}_i$  = export price of Thai chilled and frozen fresh shrimps to the U.S.A. in the  $i^{\text{th}}$  quarter.

$PRO_i$  = production quantity of Thai chilled and frozen fresh shrimps in the  $i^{th}$  quarter.

$EXC_i$  = exchange rate of Baht per U.S. dollar in the  $i^{th}$  quarter.

$CPI_i$  = consumer price index of the U.S.A. in the  $i^{th}$  quarter.

$NI_i$  = national income of the U.S.A. (dollars per person) in the  $i^{th}$  quarter.

$\beta_0$  = a constant term of the regression equation

$\beta_{1-5}$  = variable coefficients

$\varepsilon$  = an error term

### Variable Selection

One condition of the regression analysis is that an independent variable has no or low relation to others. Otherwise, the analysis will face the problem of multicollinearity. The common way to avoid the multicollinearity is to check correlation between the independent variables and withdraw one that show high correlation (more than 0.80) (Prasit-rathsint, 2000). By using this common way, high correlation among the independent variables is not found. Therefore, the analysis is quite saved from the multicollinearity problem.

### Hypothesis Testing

The hypotheses are set for the regression analysis as

$$H_0 : \beta_1 = \beta_2 = \beta_3 = \dots = \beta_5 = 0$$

$$H_1 : \text{at least, one } \beta_i \text{ is different from } 0$$

Significant level of 0.05 or better is used in this study. If we can reject the null hypothesis, we can conclude that at least one factor, PRI, PRO, EXC, CPI, or NI, influences the export volume.

## Results

Learning from related documents and records tells us that shrimp is one of the most important export products of Thailand with the overall export volume approximately 400,000 tons per year and 100 billion Baht in value. The U.S.A. is the biggest export market of Thai shrimp followed by Japan and the European Union. In 2010, Thailand exported 197,000 tons of shrimp products to the U.S.A. or 48 billion Baht in value increasing 5.06 percent from 2009. Although the U.S.A. is Thailand biggest export market, recent buyers' policy and measure changes such as requirement of certificates from Aquaculture Certification Council, Inc—ACC or opposition to illegal unreported and unregulated fishing drive Thai exporters to face higher cost of production and these could threat their competitiveness too (Thai Frozen Foods Association, 2010).

From Pearson's correlation analysis, we find that each independent variable significantly impacts quantity of export of Thai chilled and frozen fresh shrimps to the U.S.A. with significant level of 0.05 or better.

From the regression analysis, a constant term and coefficients of variables are presented in form of equation as

$$\text{Export} = 6230.837 - 0.008\text{PRI} + 0.175\text{PRO} + 22.090\text{EXC} - 19.924\text{CPI} + 0.105\text{NI}$$

With coefficients that have significant level of 0.05 or better, the equation tells us that the export price and the CPI have inverse relationship with the export quantity, e.g., if the export price and the CPI increase, the export quantity will decrease. On the other hand, the production quantity, the exchange rate, and the national income of the U.S.A. have direct relationship with the export quantity, e.g., if the production quantity, the exchange rate, and the national income increase, the export quantity will also increase.

## Recommendation

The conclusion of this research can give the following recommendations for export industry development of chilled and frozen fresh shrimps:

- Forecasting

The entrepreneurs and those involved should use forecasting models to find the optimal level of shrimp quantity in order to increase the efficiency of production and marketing planning. In addition, this will help reduce the risk of wrong business decision making under various circumstances.

- Industry strategy

1. The entrepreneurs of the export industry of chilled and frozen fresh shrimps should increase the market share of their important trading partners, namely, Japan, Europe, and the Middle East countries including the expansion to other areas because currently Thailand is only limited to a few market places and lacks the bargaining power in term of price. When encountering fierce competition in the major market places, it would have adverse repercussion for the whole shrimp industry if there is no other supporting market to replace the lost one.

2. At present, the United States holds the highest market share of 45 percent of all the total Thai shrimp export and takes very strict measure in the quality of its shrimp import. In addition, there is the measure of environment impact usually used as a tool of bargaining power. For example, the source of origin must be pollution-free and the fishing instruments used must be free from environment and marine life impact. Hence, the entrepreneurs should be very careful and must pay high attention to all these matters.

3. The entrepreneurs should produce variety of types and styles of more value-added products so as to increase the product value and consequently, this will provide more choices to the importers and consumers too.

4. The entrepreneurs should hear in mind the importance of keeping the standard of product quality in order to avoid any unnecessary measures of countertrade barrier and sanction and this will also build up good business ethics and long term business relationship.

## References

Bank of Thailand. (2010). *Exchange Rate Statistics*. Retrieved July 1, 2010, from <http://www.bot.or.th>. (in Thai).

- Bureau of Economic Analysis. (2011). *Foreign Exchange Rates*. Retrieved January 5, 2011, from <http://www.federalreserve.gov/releases/g5a/>
- Department of Fisheries. (2010). *Fisheries Statistics of Thailand*. Bangkok: Department of Fisheries. (in Thai).
- Dussadeevutikul, P. (2007). *The Export Quantity Prediction and Strategies Design of Thai Frozen Prawn Industry*. Thesis, Master of Engineering in Engineering Management, Dhurakij Pundit University. (in Thai).
- Food and Agriculture Organization of the United Nation. (2008). *Fishery Statistics*. Retrieved January 6, 2011, from [www.fao.org/](http://www.fao.org/)
- International Monetary Fund. (2011). *National Income Customer Prices Index*. Retrieved January 5, 2011, from <http://www.imf.org>
- Liumsricharoen, P. (2004). *Ceramics Export Forecasting by ARIMA Method*. Independent Study, Master of Economics, Chiang Mai University. (in Thai).
- Potathanapong, P. (2002). *Factors Affecting Export Quantity of Thai Frozen Shrimps and Prawns to the United States of America*. Thesis, Master of Science (Business Economics), Kasetsart University. (in Thai).
- Prakobkij, P. (2007). *An Analysis of Export Competitiveness for Frozen Shrimps and Processed Shrimps of Thailand*. Thesis, Master of Science (Business Economics), Kasetsart University. (in Thai).
- Prasit-rathsint, S. (2000). *Statistics for Social Science Research* (4th ed.). Bangkok: Fueng Fah Printing. (in Thai).
- Rungruengrit, T. (2003). *The Analysis of Thailand's Frozen Shrimps Export and Performance Competitive Advantage*. Thesis, Master of Economics (Business Economics), University of the Thai Chamber Commerce. (in Thai).
- Sahassakul, N. (2004). *The Impact Analysis of the Thai Baht Volatility on Frozen Shrimp Export of Thailand: 1997-2003*. Independent Study, Master of Economics, Chiang Mai University. (in Thai).

Thai Customs Department. (2011). *Volume and Value of Export of Thai Chilled and Frozen Fresh Shrimps to the U.S.A.* Retrieved January 15, 2011, from <http://www.customs.go.th/Statistic/StatisticIndex.jsp>. (in Thai).

Thai Frozen Foods Association. (2010). *U.S. Import Regulations*. Retrieved October 10, 2010, from <http://www.thai-frozen.or.th>. (in Thai).