

CHANGING PATTERN IN THE COMPARATIVE ADVANTAGE OF SHRIMP CULTURE IN ASIA AND THE COMPETITIVENESS IN THE JAPANESE MARKET

Minoru Tada, Kinki University, QWE01151@nifty.com
Seiichiro Ono, Kinki University, onos@nara.kindai.ac.jp

ABSTRACT

Promoting shrimp culture industry is one of the effective ways to earn foreign currencies and reduce rural poverty for developing countries. However, there is a question if rising wage rates might be a constraint for further development. Thailand, for example, has established a firm position in the industry, but its export of frozen shrimp has been decreasing and newly emerging countries such as Vietnam are following its path. This paper tries to answer this question by applying the analysis based on the revealed comparative advantage (RCA). We compared the RCA index for major exporters of frozen shrimp, and found that the trend of RCA of Thailand has declined since 1990, while that of Indonesia has been stable and that of Vietnam has been outstanding for the same period. This observation is consistent with the hypothesis that the wage rate is a key deterministic factor of the comparative advantage. What is the competitiveness of shrimp exported from major countries in the Japanese markets? Indeed, Thailand is losing its market share for frozen shrimp, but is expanding the export of high value processed shrimp. Vietnam realizes relatively high prices in spite of the low cost of production and its quality control is also gaining high reputation. Therefore, wage rate is one of the important factors shaping the changes in comparative advantage and competitiveness of shrimp culture, but the strategy of shrimp firms toward high quality and safety products is important too.

Keywords: revealed comparative advantage, frozen shrimp, processed shrimp, wage rate

PURPOSE

Promoting shrimp culture industry is one of the effective ways to earn foreign currencies and to reduce rural poverty for developing countries. Shrimp culture prevails widely in the Asia, however, there is a question if the rising wage rates might be a constraint for further development. Thailand, for example, has established a firm position in the world markets, but the export of frozen shrimp has been decreasing and newly emerging countries such as Vietnam are following its path. This paper tries to answer this question by applying the analysis based on the revealed comparative advantage (RCA), and by analyzing factors that determine the RCA.

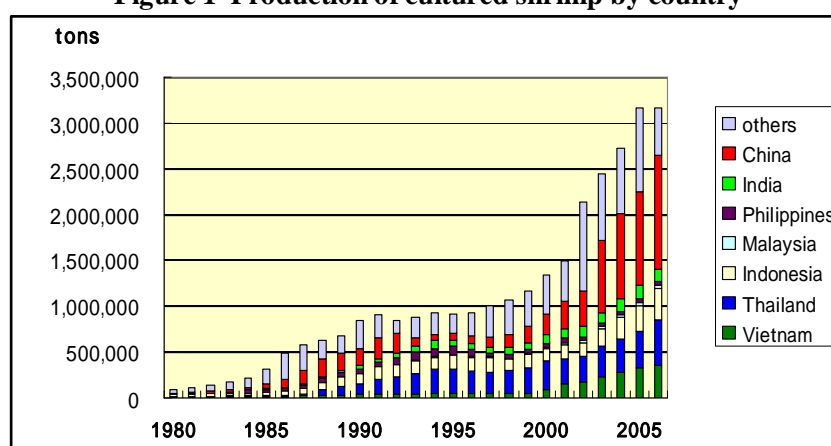
INTRODUCTION

Shrimp production and exports

Shrimp culture has grown rapidly since the latter half of the 1980s, and the share in the world shrimp production is nearly 50% at present due to the diffusion of culture farming technologies and a decline in natural shrimp resources. Asian countries such as Vietnam, Thailand, Indonesia, India, and China are major producing countries of cultured shrimp (Figure 1). Black tiger used to be a major species of

cultured shrimp, but the species are diversified and white shrimp is prevailed especially in Southern China. Intensive culture prevails in Thailand and Indonesia, while extensive and semi-extensive culture prevails in Vietnam, India and Bangladesh.

Figure 1 Production of cultured shrimp by country



Data: FAO "FISHSTAT"

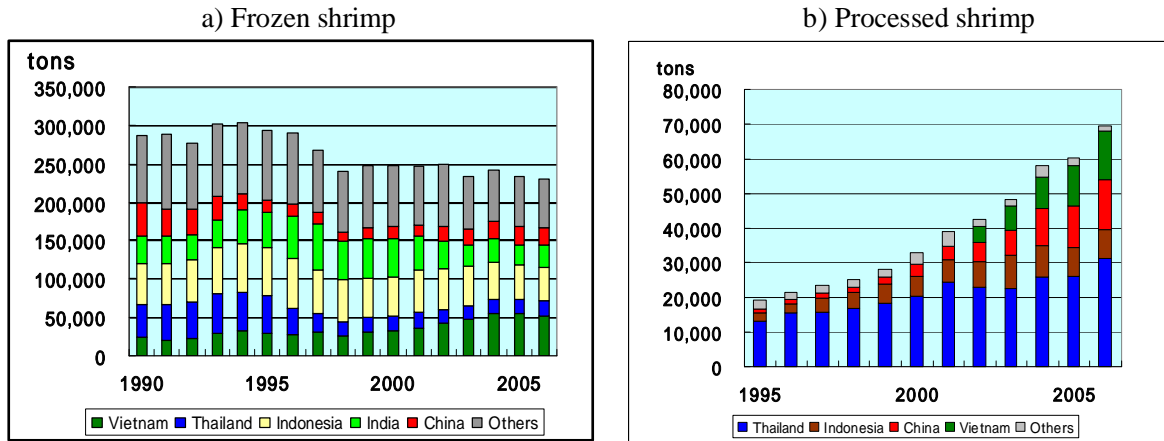
Shrimp produced in Asian countries are marketed mainly for Europe, USA and Japan. Shrimp is the most important marine products for the export of Vietnam, which accounts for more than 50% of the export value of marine products, and the ratio of the Japanese market has been around 25-30% while that of EU has been rising due to US anti-dumping measure. Recent ratio of US and EU is around 25% and 15% respectively. The most important market for shrimp produced in Thailand is USA, and the ratio exceeds 50% recently. Japan used to be a major market, but the export of frozen shrimp has been replaced by the export of processed shrimp such as "Sushi shrimp" and "Fried shrimp". USA is the most important market for Indonesian shrimp too, and the export has been increasing due to US adoption of anti-dumping measures against shrimp exported from Vietnam and Thailand. EU is the most important market for Indian shrimp and the export to Japan turned to increase in 2006 due to an improvement of the inspection for antibiotic residues. As far as the processed shrimp is concerned, the export is concentrated on specific countries namely Thailand and China. This is because the agglomeration of food processing industry and secured supply of engineers as well as freezing facilities are necessary for the development of shrimp processing industry.

The Japanese market

Japan is one of the major markets of shrimp, while the import of frozen shrimp has been decreasing gradually due to prolonged unfavorable economic performance and the import substitution with the processed shrimp (Figure 2).

Regarding the frozen shrimp in the Japanese market, Thailand used to have the firm position while it is replaced by Vietnam, and Indonesia has a stable position. India has more than 10% market share, and the export turned to rise again after 2006. Regarding the processed shrimp, Thailand still has the biggest market share, while Vietnam and China are catching up.

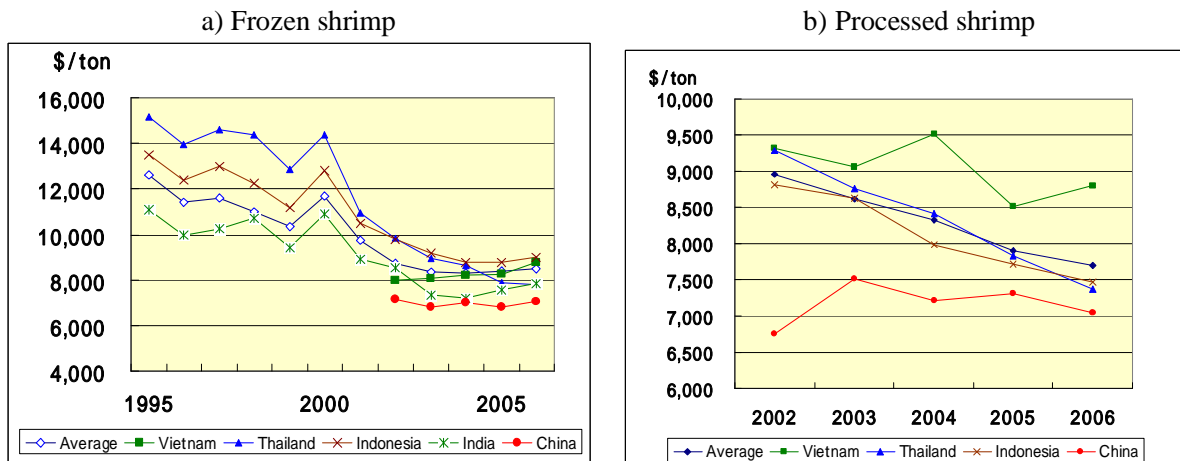
Figure 2 Japanese import of shrimp



Data: JETRO "Trade data base"

In order to estimate evaluations by the Japanese market for imported shrimps from major countries, we compare the CIF price by country and it is presented in Figure 3. Japanese CIF prices of frozen shrimp have downward trends, and the recent decline in Thai price and rise in Vietnamese price over the average price are outstanding among them. This trend is applied to the processed shrimp too, where Thailand and Vietnam have the reverse trends.

Figure 3 Import prices of shrimp in the Japanese market



Data: JETRO "Trade data base"

Based on the above observations on shrimp production and exports, we found that production and market share by country are not stable. Technology diffusion, changes in wage rates and environmental constraints might be the factors behind the observation. Then what directions are these countries moving

to? In order to answer this question, we analyze the trend of the competitiveness of major countries producing shrimps based on the concept of revealed comparative advantage (RCA).

RCA ANALYSIS ON SHRIMP TRADE

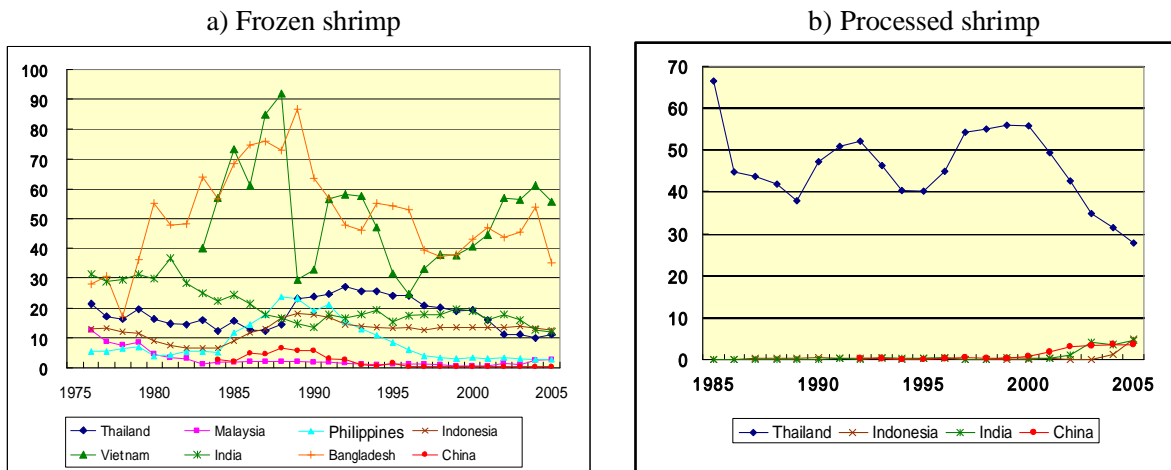
Index of Revealed Comparative Advantage (RCA) and Domestic Resource Cost Ratio (DRCR) are commonly applied to analyze the comparative advantage of specific commodity or industry. Since RCA analysis uses export value data and DRCR analysis uses price and cost data, RCA can be applied to commodities for which data availability is very limited while DRCA can adopt various scenario analyses. We apply RCA analysis since the recent cost survey data is not available, and the RCA index is defined as

$$RCA\ index = (EX_{i,j} / EX_j) / (EX_{i,w} / EX_w),$$

where EX: export value, i: commodity, j: country, and w: world, based on Balassa (1989).

Figure 4 presents the trend of RCAs for frozen shrimp and processed shrimp of selected Asian countries. Regarding the frozen shrimp, recent very high advantage of Vietnam and Bangladesh is outstanding. Thailand, Indonesia and India still keep high advantage, while the advantages of Philippines, China and Malaysia have been declining. Regarding the processed shrimp, the advantage of Thailand is outstanding while that of Vietnam, India and China has a sign of rising.

Figure 4 Trends of RCAs of Shrimp



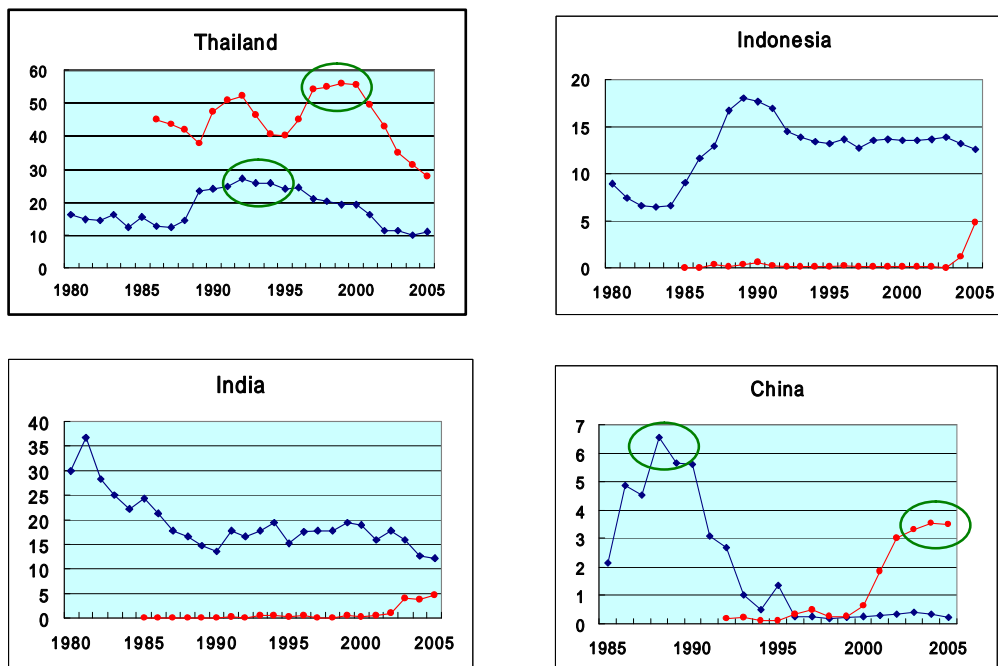
Data: FAO "FISHSTAT"

Could we expect sharp rises in advantage of frozen shrimp of Vietnam took place after the latter half of the 1990s? Indeed RCA is determined by the performance of other industries as well as the industry in question, but the rapid development of manufacturing industries took place at the same time for the case of Vietnam. Survey data of shrimp farming cost and revenue as of 1994/95 is available for major countries compiled by Asian Development Bank (ADB) and Network Aquaculture Centres in Asia-

Pacific (NACA) (1996), and Ling et al (1999) presented the analyses of the data. Based on it for semi-intensive shrimp farming, Vietnam had as higher return-cost spread as other countries, and that of Bangladesh was negative. This means cost analysis cannot provide appropriate perspective for the comparative advantage in the future. Behind the rapid rise in Vietnamese advantage of frozen shrimp, however, efforts to have compliances with sanitary standards such as getting HACCP certification conducted by government-private collaboration should be took note (Muroya (2006)). In addition, Vietnamese shrimp industry is highly evaluated in the Japanese market due to the flexibility of arranging appropriate size of shrimp (NIKKEI (2005)).

It seems difficult to find a systematic rule determining the trend of RCA of shrimp culture across countries, but we can find a certain relation between the RCA of frozen shrimp and that of processed shrimp. Figure 5 presents the trend of both RCAs for selected countries. The peaks of RCA of processed shrimp come behind that of frozen shrimp for Thailand and China. The RCA of processed shrimp is rising while that of frozen shrimp has peaked out for Indonesia and India. Therefore, we can pose a hypothesis that the RCA of shrimp shifts from frozen to processed shrimp accompanied by the economic development.

Figure 5 Comparison of RCAs between frozen and processed shrimp



Data: FAO "FISHSTAT"

This relation is presented as

$$RCA2 = f(RCA1, Y)$$

where RCA1: RCA of frozen shrimp, RCA2: RCA of processed shrimp, and Y: per capita GDP. The estimated result of this relation is as follows;

$$\text{RCA2} = 0.958 \text{ RCA1} + 0.046 \text{ Y} - 7.59 \times 10^{-6} \text{ Y}^2 - 33.3$$

(5.20) (4.35) (-1.77) (-5.46)

R²: 0.76, (): t-value,

No. of observations: 73 (including Thailand, Indonesia, India, China).

This estimation implies that shrimp processing industry gains a comparative advantage in the early stage of economic development, and turns to lose it when the economy reaches middle income level due to a rise in wage rates, given the RCA of frozen shrimp which depends heavily on natural conditions such as the constraint of blackish water and mangrove areas. The GDP per capita that gives the maximum RCA for the processed shrimp is nearly 3,000\$ which is among Thailand and Malaysia.

CONCLUSION

We compared RCA indexes for major exporters of frozen and processed shrimp, and found that Vietnam gains outstanding comparative advantage for frozen shrimp. In addition, it was found that the middle income countries whose GDP per capita is around 3,000\$ have possibility to gain the maximum RCA for processed shrimp. Considering the high level of RCA of frozen shrimp and the rapid economic development of Vietnam, the well developed shrimp processing industry might emerge soon. The opportunity might exist for Indonesia and India too. However, it should be noted that efforts to gain sanitary compliances such as HACCP certification and flexible market adaptation are also required for the potential comparative advantage to be achieved in the global competition.

REFERENCES

- ADB/NACA (1996) "Aquaculture sustainability and the Environment", Report on a Regional Study and Workshop on Aquaculture Sustainability and Environment, Bangkok, Thailand.
- Balassa B. (1989) "Comparative Advantage, Trade Policy and Economic Development", New York University Press.
- Ling B., Leung P. and Shang Y. (1999) "Comparing Asian Shrimp Farming: the Domestic Resource Cost Approach", Aquaculture, No.175, pp.31-48.
- Muroya A. (2006) "Development Mechanism of Vietnamese Fishery Industry", Agriculture and Forestry Finance, Norinchukin Research Institute Co., Ltd., pp.16-28 (in Japanese).
- NIKKEI (2005) "Rapid Increase in Shrimp Import from Vietnam", NIKKEI (Nihon Keizai Shinbun, Inc.) news paper March 15 (in Japanese).