

The ASEAN-China Free Trade Agreement: The Shattering of the Glass Industry in Thailand?

Amornrat Apinunmahakul*

อมรรัตน์ อภินันท์มหกุล

As the October 31, 2001, meeting with the representative of the glass industrial sector of the Federation of Thai Industries (FTI) drew to a cordial close, Dr. Somkid Jatusripitak, Deputy Prime Minister and Minister of Finance, was left to ponder what decision to take on the matter that had been placed before him during the meeting. The FTI representative had requested the special meeting with Dr. Somkid in his capacity as Minister of Finance in order to discuss the likely impact of the soon-to-be-ratified ASEAN- China Free Trade Agreement on the glass industry in Thailand. However, it had not taken the FTI delegate long to advance the conviction of the manufacturers that he represented that the new free pact would be inimical to the

* This case study was written by Assistant Professor Dr. Amornrat Apinunmahakul of the School of Development Economics at the National Institute of Development Administration (Thailand) and is based on archival research. NIDA cases are developed solely as the basis for class discussion, and are not intended to serve as endorsements, sources of primary data, or illustrations of effective or ineffective administrative or managerial practices. Copyright @ 2009 National Institute of Development Administration and Dr. Amornrat Apinunmahakul.

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interests of their industry and hence to the interests of Thailand as a whole. Would the Honorable Minister, he had importuned, be so kind as to protect the long-term viability of the Thai glass industry by putting all flat glass products on the “Highly Sensitive” list, thereby forestalling any preferential tariff rate for Chinese flat glass products for at least 15 years?

The arguments set forth by the FTI representative had been both comprehensive and plausible. First, he had pointed out that, given its vital supporting role as supplier of intermediate products to wide range of Thai manufacturing establishments, any damage to the glass industry would necessarily ricochet throughout the entire Thai economy. Second, unlike some other industries in the country, the glass manufacturing industry sourced nearly all of its production inputs from within Thailand, and thus contributed an exceptionally high value-added to locally sourced natural resources.

Third, he had explained that, because glass production was a highly capital-and technology-intensive industry, there was a strong incentive for manufacturers with periodic excess capacity to “dump” excess products onto their trading-partner countries – a prospect that Thai producers found especially worrisome, given that tariff reductions under the treaty would greatly facilitate such injurious conduct whenever potentially lower-cost Chinese manufacturers found themselves with supply in excess of demand in their domestic market. Indeed, in support of this latter argument, the delegate had claimed that since ratification of the ASEAN Free Trade Agreement (AFTA) in 1997, Thai glass manufacturers had witnessed the loss of 10 – 13 percent of domestic market share to cheaper glass products imported from ASEAN member nations. Finally, the industry representative pointed out, the lower labor and energy costs available in China could well motivate the multinational corporations that controlled Thailand’s glass industry to relocate their factories to China and then export their Chinese production to service demand in Thailand.

For all these reasons, the FTI delegate had concluded, it would not be in the best interests of the country to risk the decimation of the industry that could well occur if the preferential tariff rates in the proposed ASEAN-China Free Trade Agreement were to go forward with no transition period to allow the Thai glass industry time to prepare for the onslaught of potentially devastating Chinese competition.

Against these earnest arguments articulated by the FTI delegate, the Deputy Prime Minister and Minister of Finance knew that he had to juxtapose other equally earnest opposing perspectives, principally that of the Department of Trade Negotiation in the Ministry of Commerce. It was the long-held view of the Department of Trade Negotiation that the purpose of the both the ASEAN and the upcoming ASEAN-China free trade agreements was to prepare Thailand for the inevitable World Trade Agreement. Thailand had been a member of the World Trade Organization (WTO) since January 1, 1995. Once trade negotiations among member countries were concluded and ratified by each member nation, Thailand would have to open her domestic market not only to ASEAN countries but to all the 153 WTO members.

Additionally, in championing the principle of free trade agreements, the Department of Trade Negotiation had consistently advanced the argument that such agreements helped to expand the boundaries of the Thai domestic market by including the markets of neighboring nations. Not to be overlooked, the Department had reasoned, were the facts that such agreements were also instrumental in attracting additional foreign direct investment to the region and increased ASEAN's power when negotiating with other regional trade blocs, such as the North American Free Trade Association, the Common Market of the Southern Cone (Latin America), and others.

Thus, as he pondered how to go about resolving the matter that the FTI representative had laid before him, the Deputy Prime Minister/Minister of Finance realized that both points of view – those of the FTI representative and those of the

Department of Trade Negotiation -- had to be taken in account and weighed, sifted, and balanced. He was also cognizant that there were several analytical different approaches that could be employed to arrive at a decision as to whether or not the grace period requested by the industrial representative was truly justified. Moreover, regardless of whether he approved or denied the requested grace period for Thai glass manufacturers, the government would still need policy recommendations concerning what might be done to help local entrepreneurs and Thai workers at whatever point in time the tariff reductions specified in the ASEAN-China Free Trade Agreement were fully implemented.

History of the Glass Industry in Thailand

The origins of glass manufacturing industry in Thailand could be traced to the shortage of radio tubes for military communications during World War II. Consequently, in 1946, the Thai Navy established a department whose mission was to produce glass tubes and heat resistant bricks for military use. In 1955, the department became a publicly-owned enterprise named “Glass Organization” under the Ministry of Defense.

Glass production in the private sector initially was operated on small scale by a limited number of families using traditional glassblowing techniques. Industrial-scale manufacturing was not founded until 1953, when the Thai Glass Manufacturing Company joint-ventured with the Australian Consolidated Industries Company to produce bottles. The joint-venture company soon thereafter assumed the name, “Thai Glassware Industry.” With its production for both the domestic and export markets, grew to become the largest producer of glass bottles in Southeast Asia. Until the Thai government launched the import substitution policy in 1961, Thai Glassware Industry Company was the only industrial-scale glass manufacturer in the country.

Since no production was available before 1963, all flat glass products in Thailand were imported. The origins of the industry in Thailand could be traced to the government's decision to bolster the country's manufacturing base by incentivizing the substitution of locally produced products for those that had heretofore been imported. Industries that were deemed to be fundamental supporting industries for other sectors of the economy were specifically targeted, as were those products whose importation incurred substantial expenditures of precious foreign exchange currencies. Flat glass manufacturing was among the first to benefit from this new import substitution policy, due to the critical role of its output to the operation of diverse sectors ranging from construction to the production of automobiles, electrical and electronic products, furniture, and so on.

Thus, from the inception of the industry, the Thai government's Board of Investment (BOI) afforded glass manufacturers a variety of incentives. Among the more important of these were income tax holidays, tariff exemptions on machinery and production inputs, and tariff protection of 50-60 % on all glass products produced in the country. All firms in the industry could apply for these BOI privileges for the first five years of their investment, and re-apply for an extension of another five to ten more years were the firms to make an additional investment afterwards.

The Birth of the Sheet Glass Industry

Established on June 24, 1963 in Samutprakran, Thai Glass Company Ltd. became the first Thai manufacturer of basic sheet glass. But, it did not take long for its owners to realize that its initial production capacity of 10,500 metric tons per annum would soon prove inadequate to meet the growing demand for sheet glass that accompanied the rapid expansion of the Thai economy that was underway in the 1960s. Hence, to increase its production capacity, Thai Glass Company decided in July 1964 to enter a joint venture arrangement with Asahi Glass Company of Japan, one of the world's leading glass manufacturers. Shortly thereafter, the joint-venture company became Thai-Asahi Glass Company (TAGC).

With the re-named company's capital investment base and technological know-how greatly augmented by the resources brought by its Japanese partner, Thai-Asahi Glass Company proceeded to invest in a second production line with an additional capacity of 29,250 metric ton per year. This second line was built at the same Samutprakran plant that contained its first production line and came on stream in November 1964. This greatly bolstered production capacity and capability enabled TAGC to launch its first tinted sheet glass and clear sheet glass product lines for the domestic market in January 1966, with its excess supply exported later in the year – thus initiating the first-ever exportation of Thai-made sheet glass.

Because of the capital- and technology-intensive nature of glass manufacturing, TAGC occupied from its inception a monopoly position in the domestic Thai market. And, the company was not shy about using its market power to sustain its monopoly position. For example, seizing on its “first-mover” advantage, the company adopted the tactic of periodically investing in new production capacity far beyond the forecasted demand over a 20-year time horizon. As a result, any potential new market entrants had to contemplate the high likelihood that such a move would precipitate a price war with TAGC – a prospect that none could relish, given TAGC's commanding competitive position and pricing power. Thus, TAGC was able to sustain its monopoly position, and all the advantages that came with it, for nearly 25 years after its inception.

In 1970, in response to a more sophisticated market, TAGC built its second plant, at a cost of ThB 2 billion, in Chonburi, along Thailand's southeastern seaboard. Built to address the needs of a more demanding domestic market for clearer and smoother glass, the plant incorporated state-of-the-art technology called “float process.” This new production process improved the quality of sheet glass to such an extent that an image reflected through the glass had no distortion whatsoever.¹ Considered worldwide as *the* top-quality glass, float glass was widely

used in high-rise buildings and as an input to the production of other high-quality products such as heat absorbers, glass figurines, mirrors, tempered safety glass for automobiles, LCD monitors, and so on. With the Chonburi plant, which was granted BOI investment privileges in 1981 and began production in 1983, TAGC ushered in a new era of product differentiation in the glass manufacturing business. The manufacturing of high quality float glass in Thailand enable Thai customers to procure the product *locally*, resulting in the enhancement of both the quality of final products and the production efficiency of other related industries.

New Entrants and the Further Evolution of the Industry

Thailand had launched the import substitution policy to promote industrialization in concert with the first national economic development plan that was promulgated in 1961. The use of tariffs and BOI's investment privileges were the major instruments employed to pursue the targets specified in the development plan. These policies were quite successful in attracting foreign direct investment to promote local industry, propelling Thailand's average annual growth rate to 7.3 percent for the following two decades.

However, to sustain and even accelerate the high rate of growth, the Thai government surmised that the country would need to amplify her exports by both advancing the competitiveness of domestic producers and encouraging more new investment in manufacturing industries with strong export potential. Thus, a shift in the country's industrial policy to export promotion took place in 1981. This shift would soon have significant impact on the nascent glass products industry, as explained below.

First, the end of TAGC's long reign as the monopoly producer of glass products in Thailand came in 1989 with the founding of Siam Glass in Chachoengsao, directly east of Bangkok. Established with a BOI investment promotion, Siam Glass,

with a capacity of 29,700 metric tons a year, concentrated solely on the production of basic sheet glass. However, with a technology problem centered in its employment of the conventional glass extrusion method (a method that relied on rolling-out plates to smoothen the surface of sheet glass, thereby causing wavy reflections in the glass), the company's product line was quickly relegated to the lower end of the quality spectrum. In this sense, although the Siam Glass' entry into the market ostensibly ended TAGC's monopoly and turned the industry into a duopoly, the newcomer did not constitute a serious competitive threat because its low-quality products appealed to a distinctly different market segment – i.e., customers whose primary concern was low price, as opposed to product quality.

The duopoly created by the entry of Siam Glass into the glass manufacturing industry did not last long. Two years later, in 1991, a firm called Bangkok Float Glass Company received BOI promotion for its foray into the business. The principal shareholders chose to locate their 131,500 metric tons plant in Chonburi, within a few kilometers of the TAGC plant. Employing sophisticated float-glass production technology fully comparable to that used by TAGC, Bangkok Float Glass signaled its intention to vie with its larger and more established competitor for a profitable share of the same high-quality segment of the market that TAGC had heretofore had all to itself. Thus, the industry structure evolved into an oligopoly.

Within a year of Siam Glass' entry into the glass manufacturing industry, Thai Cement Industries Corporation formed a joint venture arrangement with U.S.-based Guardian Industries Corporation for purposes of producing float glass in another geographic area of the country. In 1992, the new corporate entity, Guardian Siam Glass, with BOI investment privileges, launched its 131,400 metric ton plant at the site of the Thai Cement Industries property in Saraburi, northeast of the capital. However, forecasting even greater market demand in the near-term future as well as the export opportunity, in 1995, the company applied for another BOI promotion pursuant to a

ThB 3.3 billion investment in a plant to produce clear and colored float glass. This second plant, located in the eastern-seaboard city of Rayong, had a production capacity of 186,000 metric tons per year.

Meanwhile, TAGC had not been standing idle as this bevy of new entrants invested in increasingly greater capacity production plants. Indeed, even as Guardian Siam Glass' application for BOI promotion for its Rayong plant was still under consideration by the Board, TAGC applied for its third BOI investment promotion for a new ThB 3.5 billion plant to produce float glass in Rayong province. With a production capacity of 182,500 metric tons a year, the plant was to serve as a supplier of high-quality glass to Japanese firms in Thailand and overseas. The product line was to be an input into the manufacturing of -- among other end-use products -- automobiles, television and computer displays, camcorders, photocopying machines, and data projection equipment.

The 1997 Financial Crisis and the Consolidation of the Industry

Into this expanding assemblage of lively industry participants, the gale-force winds of the financial crisis that began in Thailand in 1997, and soon spread throughout Southeast Asia, blew especially harsh, soon precipitating a major restructuring of the Thai flat glass industry. TAGC was the first manufacturer to fall victim, followed by Bangkok Float Glass and Guardian Siam Glass.

Because of a dramatic devaluation of Thai Baht during the crisis, the debt-equity ratio of TAGC zoomed upwards to more than double its earlier level. As a result, the company had decided, in the beginning of 2000, that its best course of action was to sell its Thai-owned shares to the Asahi Glass Company (AGC), its Japanese joint-venture partner. Then, on the first of January 2001, Bangkok Float Glass Company, facing difficult financial problems similar to those that had precipitated the sale of TAGC, accepted an offer by AGC to take over of its assets,

including its prize Chonburi factory. Struggling with more or less the same situation, Thai Cement Industries chose to maintain the core business of its conglomerate -- that is, the cement product lines -- but to relinquish all of its shares, debts and assets in Guardian Siam Glass to its U.S.-based partner, Guardian Industries, who became the sole owner toward the end of 2001.

Thus, in the space of a few years, the flat glass industry in Thailand went from four, all- or partly Thai-owned manufacturers to an industry comprised of just three firms, only one of which remained under Thai ownership. Below is presented a snapshot of the industry players in the aftermath of the crisis.

Company Name Ownership Plant Sites & Product Lines

Asahi Glass Company (AGC)	Japanese (100%)	Samutprakran (1 plant): Sheet Glass Chonburi (2 plants): Float Glass Rayong (1 plant): Float Glass
Guardian Industries Corporation (GIC)	American (100%)	Saraburi (1 plant): Float Glass Rayong (1 plant): Float Glass
Siam Glass Company (SGC)	Thai (100%)	Chachoengsao (1 plant): Sheet Glass

As shown in the table above, Asahi Glass produced both sheet and float glass – sheet glass at its Samutprakran plant and float glass its Chonburi and Rayong sites. Guardian Industries, however, produced only float glass at its Saraburi and Rayong factories, while Siam Glass produced only basic sheet glass at its one plant in Chachoengsao. As of 2000, the industry had a total production capacity of 744, 436 metric tons a year which had risen over the past 37 years along with the expansion of the Thai economy.

In addition to flat glass, there was other glassware produced in Thailand, for example, glassware for tableware, fluorescent lamps, light bulbs, and bottles for the packaging in the beverage, medicine, and cosmetic industries. However, the investment and employment requirements in these other segments of the glass manufacturing industry were considerably smaller compared to those of the three flat glass manufacturers. (See Table 1 in the Appendix for a summary of the number of firms, the registered investment, and the total employment of the glass industry in Thailand in 1999 and 2000.)

The Main Characteristics of Glass Production

Although the technology underlying its making in *modern* times bore no resemblance to techniques used millennia ago, the use of glass has had a long and distinguished history, stretching back nearly 5,000 years. It is believed that it was discovered around 3000 BC in Mesopotamia, possibly by the Syrians. In antiquity, glass was a veritable luxury. In the Christian Bible, it was compared favorably to gold (*Book of Job 28:17*). The furnaces that were used to melt the glass were small, holding hardly enough heat to properly melt the glass. Making the glass was slow work and costly.

Syrian glass was a simple melted mixture of soda ash, lime and sand. Glassmakers formed it into final shapes by sculpting it while still hot. When Egypt conquered Syria in 1,400 B.C., the captured Syrian glass workers were sent back to Egypt. There they refined glass making into a high art. Glassworkers produced vessels, vases and eating utensils by pouring several thin layers of molten glass into sand molds in the shape of the object. The glassware was decorated by adding molten colored glass drips to the final layer.

The ancient Greeks used glass in their buildings, sometimes lining their baths and rooms with the material. *Window* glass originated in Rome during the third century A.D., but it was very thick and translucent. That is, it let light in, but people

could not see out. In 1291, on the Italian island of Murano, workers developed a clear, almost transparent glass called "cristallo," from which originated the word, "crystal." Murano glassware became popular throughout Europe, enabling Italy to build up a thriving export trade on it.

In the Middle Ages, glass making was still a hand-made process. Window glass was made by blowing the molten glass into a flat disc which was then spun so that centrifugal force caused the glass to thin out and flatten. These discs were cut into small panes of glass, usually limited to 18 square inches.

By the time the Industrial Revolution was at its height in the late-1800s, developments in glass manufacturing had advanced to the point where glass items had become just another mass-produced product imbued with various attributes to satisfy a diversity of industrial and household needs. Further, as the science and engineering of glass as a material became much better understood, a new production method -- float glass production -- was invented by Sir Alastair Pilkington, the President of the Pilkington Brothers Company in UK. A process by which glass is made by letting the glass become solid on a molten metal, the float glass production method remains the way by which 90% of flat glass is made today.²

The Essential Raw-Material Inputs

As the ancients discovered long ago, the most important input for the production of glass was a special kind of *sand*. Called "silica sand," it had to be comprised of at least 95-99% silica dioxide (SiO_2), an essential element that determined the quality of output.

Silica sand was found in great abundance along Thailand's eastern and southern seashores -- particularly in Chonburi and Rayong provinces, where the presence of a number of sand mining firms also helped to reduce significantly the

logistics cost of glass manufacturers in the vicinity. However, some of the country's plentiful supply of silica sand – estimated at 253 million metric tons -- lay on tourist beaches or inside national forest reservations. Because of its acknowledged criticality as an input into the production of glass, on the 13th October 1970 the Thai government enacted a natural resources conservation bill specifying that sand mining was permissible only for internal use, not for export.

With the exception of soda ash, which was mostly imported from China, Thailand also had an ample supply of the other raw material inputs for glass production. They were:

- i) Dolomite, an ore with the chemical compound of calcium and magnesium, $(\text{CaMg}(\text{CO}_3)_2$),
- ii) Limestone with at least 50% of calcium carbonate (CaCO_3),
- iii) Feldspar, a chemical compound of potassium feldspar (K_2O) and sodium feldspar (Na_2), and,
- iv) Soda Ash, a sodium carbonate in the powdery white form, (Na_2CO_3) .

An Energy-Intensive Industry

Glass manufacturing was an energy-intensive industry. In the production process, materials were melted continuously at a temperature of 1,500 degrees Celsius. With fuel costs comprising about 20% of the total cost of production, the two periods of rapid energy price escalation, 1970-73 and 1978-80, severely affected the production costs of the industry. Thai glass producers were in a disadvantaged position relative to their Indonesia counterparts, who benefited from an energy price subsidy policy. (See Table 2 in the Appendix for a breakdown of the percentage of glass production costs contributed by each production factor in Thailand.)

An Economy of Scale Production

In addition to its energy consumption requirements, the technology of glass production was an economy of scale production technology in which the unit cost of production declined as the level of output increased. That is, the high share of fixed cost resulting from the extremely expensive production technology placed a premium on maximizing output quantity, so that each unit of production bore the smallest fraction possible of fixed cost – thus enabling attainment of the lowest possible average cost per unit.

A Continuous Production Process

Not only was the glass production technology one in which scale economics were a vital prerequisite to the ability of industry players to compete, it was also a technology utilizing a continuous production process. Furnaces in the plants contained over 1,000 metric tons of liquid glass that had to be maintained at a very high temperature around the clock – necessitating the production of glass products 24 hours a day. Once heated, the furnaces could not be shut down until they expired, about every 7 or 8 years. “Cold repairs” – i.e., the rebuilding of the furnaces when they did expire -- entailed draining the huge vats of all liquid glass before the molten material cooled down. This was an extremely delicate operation because obstructions, such as a clogging of the heat-resistance bricks inside the furnace, could severely damage, even destroy, the entire furnace. Cold repairs were thus costly events and usually took 8 to 12 months to complete.

A key ramification of the continuous production process was that the supply of flat glass was less elastic to demand, or at least to *domestic* demand. Unable to reduce production in response to declines in domestic market demand, manufacturers were left with essentially one possibility for ridding themselves of their excess supply – dump their excess product in an export market. During the Asian

economic downturn in 1997, Thai manufactures complained that this was precisely what the Indonesian producers had done. They dumped their float glass into Thai market at prices below their average cost, prompting urgent pleas from Thai manufacturers for anti-dumping protection from the government. In response, the Thai Ministry of Finance applied a 40% surcharge on the C.I.F³ of clear and colored float glass imported from Indonesia.

Market Structure and the Industrial Competitiveness

As intimated in the discussion above, some dynamics of competitive behavior in the glass industry as a whole were greatly influenced by certain characteristics of the production process itself. Consideration of industry and market structure provided even greater illumination of the nature of competitive dynamics in the industry.

The Domestic Market: An Oligopoly

As mentioned earlier, the glass industry in Thailand had evolved from an initial industry structure of monopoly, with TAGC as the monopolist in the flat glass market, to its present structure as an oligopoly comprised of three firms. TAGC had been able to forestall the entry of new competitors for a quarter of a century by continuously investing in production capacity far in excess of the levels of demand in the domestic market. Eventually, however, several other firms succeeded in breaking into the market; and, even though restructured in the aftermath of the 1997 financial crisis, these restructured firms continued to comprise the makeup of the glass industry oligopoly.

As successor to TAGC, Asahi Glass Company (AGC) remained the industry leader, largely due to its possessing the largest production within the group – i.e., 57% of total industry capacity. Guardian Industries Corporation (GCI), with 39%

of the total industry production capacity, was considered AGC's sole *true* competitor. With its 4% of total industry capacity and low-quality basic sheet glass for the low end of the market, Siam Glass Company (SGC) was an altogether insignificant competitor for both AGC and GCI. The extent of SGC's non-competitiveness could be glimpsed from the fact that it was constrained to rely upon AGC's distribution channels for marketing its products. Thus, in terms of *float glass*, the Thai glass industry structure was essentially a classic *duopoly*.

Competition in the float glass market mostly revolved around non-price strategies. In jockeying for competitive position, AGC acted as the price leader, while GIC and SGC followed. None of the firms had any real incentive to engage in price wars because given the imperatives of the production technology and the production process, they all understood that pricing competition would only decimate their profitability. Hence, in lieu of attempts to use price as a competitive weapon, AGC and GIC employed tactics such as product differentiation, advertisements, public relations, brand loyalty, and access to industrial customers via cultural ties.

Market Segmentation

The domestic market consisted of a number of industrial sectors, with the construction industry being by far the largest consumer of the glass industry's output. With flat glass needs ranging from clear sheet glass to float glass to figured glass, to heat reflective glass to insulating mirrors, to safety glass (among others), the construction industry consistently absorbed about 75% of the total output of the flat glass industry. The remaining 25% of glass output was consumed by the automobile, electronics, and other domestic industries. To reach industrial customers in these segments of the market, AGC and GIC had built a network of distribution agents across the country. However, those industrial customers with their own production specifications or special needs could also place their orders directly with the glass producers.

The New Role of Multinationals in the Export Market

Because the manufacturing of flat glass was both capital- and technology-intensive, the world market for flat glass actually was dominated by a few multinational firms that possessed the production know-how and worldwide marketing and distribution networks. Among these were Pittsburgh Plate Glass (US), Pilkington Brothers (UK), Saint Gobain Pont A Mousson (France), BSN Gervaisi Danone (Belgium), and, Asahi Glass Company (Japan). Their near-global presence occasionally precipitated the promulgation of policies that sometimes had the effect of dramatically altering longstanding practices under which some of their subsidiaries had heretofore operated. Such was the case with the two largest Thai glass producers.

Prior to the takeover of Thai-Asahi Glass and Guardian Siam Glass by Asahi Glass Company and Guardian Industries Corporation, respectively, the technological and production imperatives of glass production often resulted in the exportation of excess supply to other countries. This “dumping” tactic (called such because the export price for sheet and float glass was usually lower than the price sale by producers in their own home market), had been particularly attractive to glass manufacturers because it enabled them to avoid the high cost of carrying inventories of excess production.

However, after the restructuring of the two largest glass producers into 100% foreign-owned entities, it was no longer possible for excess supply to be “dumped” onto other countries. Exportation of products, for any and all reasons, now required purchase orders from the respective parent companies. The purpose of this mandate was to protect the total profit of the multinationals by ensuring that none of their affiliates in various part of the world would dump their products and undercut the price of each other.

The Competitiveness of Thai Glass Industry

Although there had been an upward trend of exports for all glass products in the past 15 years, certain flat glass products – specifically, float glass, safety glass, and, mirrors – were, respectively, the top three commodities for export. (See Table 3 in the Appendix) Provided that Japan and the US are the major trade partners of Thailand, some of the products are shipped to other countries also insofar as there is an order from the respective parent companies. Glass products of Thailand had been exported to near and far countries around the world ranging from Hong Kong, Singapore, Malaysia, Australia, Saudi Arabia and so forth.

Further, as can be seen in Table 4 in the Appendix, the import values of all flat glass also increased steadily from 1992 to 2000, in consequence of Thailand's economic expansion, as well as the effects of the 1997 ASEAN Free Trade Agreement (AFTA). In accordance with the provisions of the AFTA treaty, ASEAN members gained preferential access to each other's domestic by way of a reduction in tariff rates on goods and services that member nations exported to each other. For example, under AFTA, most of the flat glass and glassware imported from ASEAN countries had enjoyed a tariff rate of less than 20% since 1997, whereas glass products imported from outside ASEAN still faced a tariff of 50-60% in Thailand. Hence, as shown in Table 4, there had been a dramatic increase in import values from 1998 onwards, in particular for float glass.

Nevertheless, the tariff reduction among ASEAN nations had become a major concern to the glass manufacturers in Thailand. Thai producers claimed that the tariff reduction had allowed glass manufacturers in ASEAN countries with a lower cost of production to dump their excess supply on Thailand during periods of decline in domestic demand in their home markets. In this regard, the dumping of excess float glass supply by Indonesian producers in 1997 was seared into the memories of Thai

manufacturers, who feared that the ASEAN-China Free Trade Agreement might well facilitate a repeat performance of such dumping -- and this time with a considerably more formidable competitor nation.

Despite the fact that Chinese sheet glass production was aimed mainly at the Chinese domestic market, and notwithstanding the fact that the quality of Chinese-made float glass was inferior to its Thai-produced counterpart, glass manufacturers in Thailand still fretted about the long-term implications of the ASEAN-China Free Trade Agreement. With her enormous economy, China had a potential comparative advantage in production. Chinese glass and glassware manufacturing could easily attain an efficient scale of production and, in time, achieve the lowest average cost per unit of output. Once attained, and with the free trade agreement in place, what would prevent Chinese producers from obliterating the Thai glass industry by dumping their cheaper, if somewhat inferior, float glass onto the Thai market? (See Table 5a for data concerning the value of trade in glass and glassware between China and Thailand in 1996 and 2000, and Table 5b for data concerning the export of glass and glassware of ASEAN countries in 1996).

Further, Thai glass producers also worried that the ASEAN-China Free Trade Agreement might well alter the production strategies of their multinational parent companies. Why would not Asahi Glass and Guardian Industries find it extremely attractive to take an advantage of the agreement by producing glass products in China for that country's vast domestic economy and then export any excess output to the ASEAN market with no tariff barriers? The Thai glass manufacturers were thoroughly convinced that the ASEAN-China Free Trade Agreement threatened the viability of the glass industry in Thailand, and could damage the supply chain of other Thai industrial sectors that used flat glass and other glassware as an intermediate input for to their production processes. In brief, they argued, the ASEAN-China Free Trade Agreement could end up hindering the development of the whole manufacturing sector of Thailand

- unless the Thai government exercised its right to insist upon a satisfactory transition period before the full magnitude of the proposed tariff reductions took effect.

The Minister's Dilemma: To Protect or Not to Protect

There was no question in the Minister Somkid's mind about the centrality of Thai glass industry to the well-being of the Thai industrial sector. He knew that several sectors were greatly reliant on the glass industry for the supply of products with which to sustain their vitality and competitiveness.

He was also quite conversant with the competitive dynamics that tended to be set in motion by virtue of the technology and production imperatives of glass manufacturing – e.g., the tendency of manufacturers with excess capacity to dump their oversupply onto neighboring countries due to their inability to quickly adjust production to keep their domestic markets in supply-demand equilibrium. Indeed, as the FTI representative had just reminded him, this had happened a few years earlier with Indonesian manufacturers. The Minister understood that were such dumping to occur again under the ASEAN-China Free Trade Agreement, the effect on the Thai glass industry could indeed be utterly devastating. Finally, he was aware that the dynamics of global competition were such that the multinational owners of the two largest Thai glass producers might be tempted to relocate their production to China and export product to Thailand – an eventuality that would constitute a huge loss of capital investment and technological know-how.

Notwithstanding these concerns, first and foremost in the Minister's mind was the determination to arrive at the *right* decision, the *correct* decision – the decision that would, in time, be shown to have been in the best interest of both the glass industry and Thailand. He fully realized that if he were to decide against the requested tariff-reduction transition period, and then the Thai glass industry fell upon hard times; he would be roundly criticized and condemned for the resulting hardships that would befall Thai industrial users of glass products and the affected workers.

But, at the moment, all that he had were alarming scenarios sketched by the representative of an understandably concerned Thai glass industry. Against these alarms, he had to recall the well-known position of the Department of Trade Negotiation in the Ministry of Commerce. Dr. Somkid knew well that a decision of his part to support the glass industry's request for a fifteen-year transition period would be vigorously contested by the Department of Trade Negotiation, raising the unwelcome prospect of discord between the two ministries. He would therefore need to assure that the rationale for the decision was exhaustively supported by in-depth analysis and indisputable conclusions.

With Thailand's list of merchandise trade due for submission to the Trade Negotiation Committee within a few days, Minister Somkid appreciated that time was of the essence. Whatever his decision might ultimately be, it had to be taken within the next several days. Thus, it was with a deep sigh that he turned his attention to the assembled facts, determined to perform an analysis that would yield the right, the correct, decision.

Appendix

Table 1: The number of firms, registered investment, and employment of the glass industry of Thailand from 1995-2000.

Year	Number of firms	Registered investment (millions THB)	Employment
1999	116	876.73	17,081
2000	174	27,267.88	19,352

Source:

1. Data for the year 1999 excerpted from a report on *“Master plan for Sectoral Economics: Glass and Ceramic Industries”* Office of the Industrial Economics, Ministry of Industry, Thailand, (Table 7.3, page 168), 2002.
2. Data for the year 2000 excerpted from a report on *“The Impact of ASEAN-China Free Trade Agreement (FTA) on Competitiveness and Trade Opportunities of the Mining and Primary Industries in Thailand.”* Department of Primary Industry and Mines, Ministry of Industry, Thailand, (Table 4-18, pages 383-4), 2008.

Table 2: An estimation of the cost of production for the glass industry in Thailand.

Items	Percentage share in total cost of production
Raw materials	
- Silica Sand	9.80
- Dalomite	2.06
- Limestone	0.53
- Feldspar	0.23
- Scrap glass	5.58
- Soda Ash	2.27
- Sodium Sulfate	0.19
- Miscellaneous	0.34
Energy cost	20.00
Labor cost	8.00
Depreciation	18.00
Transportation	6.00
Others	<u>27.00</u>
Total	<u>100.00</u>

Source: Mayuree Panvong, "A report on 'Trends and Direction of the Glass Industry", Department of Primary Industry and Mines, Ministry of Industry of Thailand, (table 5, page 22), 2005.

Table 3: Export values for some glass products from 1992 - 2000.

(in THB million)

Product	1992	1993	1994	1995	1996	1997	1998	1999	2000
Figure glass	9.7	19.1	2.0	29.3	95.2	184.8	177.0	245.3	235.1
Sheet glass	0.9	1.9	1.8	2.5	3.2	2.4	5.3	5.3	55.0
Float glass	439.5	1,018.14	1,445.4	1,609.6	872.5	1,054.6	1,702.0	2,062.5	3,524.1
Bended glass	4.1	3.9	11.2	90.1	88.8	5.4	3.7	8.2	23.1
Safety glass	190.2	220.8	221.3	206.6	215.3	228.4	326.9	725.4	1,007.3
Mirror	148.6	145.3	134.7	180.7	234.5	298.4	357.7	376.7	589.6

Source: Mayuree Panvong, A report on '*Trends and Direction of the Glass Industry*', Department of Primary Industry and Mines, Ministry of Industry of Thailand, (table 6, page 29-30), 2005.

Table 4: Import values for some glass products from 1992 - 2000.

(in THB million)

Product	1992	1993	1994	1995	1996	1997	1998	1999	2000
Figure glass	49.2	90.9	14.0	6.6	23.8	32.7	238.4	972.4	1,647.6
Sheet glass	16.3	13.7	23.0	21.4	28.3	21.8	257.6	196.5	210.7
Float glass	445.8	721.7	604.6	599.4	800.8	495.8	25,323.0	21,179.3	21,418.9
Bended glass	88.4	69.9	97.2	16.2	21.7	41.3	1,513.9	1,532.9	2,214.9
Safety glass	81.1	127.2	181.9	139.0	163.1	109.9	1,138.2	806.6	1,469.1
Mirror	128.7	165.3	143.1	252.3	295.6	330.0	2,355.9	4,657.9	1,942.0

Source: Mayuree Panvong, A report on '*Trends and Direction of the Glass Industry*', Department of Primary Industry and Mines, Ministry of Industry of Thailand, (table 13, page 37-38), 2005.

Table 5a: The value of trade for all glass products between Thailand and China in the year 1996 and 2000

(in USD)

	Year 1996	Year 2000
Thailand exports to China	9,121,777	24,331,583
China imports from the world	570,621,723	1,408,948,169
World exports to the world	26,284,520,501	30,725,830,271
Total export of the world	4,997,004,754,400	6,222,569,387,296

Source: excerpted from United Nations Commodity Trade Statistics Database.

Table 5b: The values of export of the glass industry of China and each ASEAN country in 1996.

(in USD)

Country	Total Export	Export of Glass	Country	Total Export	Export of Glass
China	151,047,461,759	598,756,119	Singapore	125,007,762,852	372,740,130
Thailand	55,678,127,622	209,498,394	Burma	N/A	N/A
Brunei	N/A	N/A	Cambodia	N/A	N/A
Indonesia	49,814,695,936	233,098,592	Laos	N/A	N/A
Malaysia	78,314,873,320	203,564,003	Vietnam	N/A	N/A
Philippines	20,542,472,192	19,086,298			

Source: excerpted from United Nations Commodity Trade Statistics Database.

Note: No trade statistics of Burma, Cambodia, Laos, and Vietnam was available before year 2000, while the trade data of Brunei during 1994-96 is missing from the database.

Endnotes

¹ To distinguish a high quality flat glass from its low quality counterpart, the former usually is called 'Clear Anneal Float Glass' (or merely 'Float Glass'), while the later is called 'Basic Sheet Glass,' (or just 'Sheet Glass').

² See "History of Glass." *Rohmer + Stimpfig*. 3 May 2006

<http://www.glassonweb.com/glassmanual/topics/index/history.htm>

³ Cost, Insurance, and Freight

References

Mayuree Panvong. (2005). "*Trends and Direction of the Glass Industry.*" A report submitted to Department of Primary Industry and Mines of the Ministry of Industry of Thailand.

Mingsarn Kaosa-ard and others. (2002) "*Master plan for Sectoral Economics: Glass and Ceramic Industries.*" submitted to the Office of the Industrial Economics of the Ministry of Industry of Thailand.

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