The Impact of China's Demand on Domestic Value Chains

Lessons from the cassava value chains in Thailand

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Abstract

The 2005 Agricultural Commodities Boom, partially driven by China, was brought to a temporal halt by the 2008 global economic crisis. Nevertheless, China's commodity demand has since recovered and will continue to increase. Slower post-crisis recovery in the North means that China will lead demand in global agricultural commodity market and its influence continue to strengthen.

China is at a different developmental stage from the North. Its commodity demand might differ, in terms of applications, specifications, volume and quality requirements and buying power. This raises two questions. What happened to the domestic value chains when the external market shifted to China? What would be the longer term implications for the domestic value chains?

This paper looks at the changes that occurred in Thailand's two cassava value chains as their markets shifted to China. It also looked at the implications on and the responses of domestic value chain actors to this external market restructuring. Lessons could be drawn on the impact of external market shift that is likely to persist for cassava and for global agricultural commodity chains in general.

Keywords: Global Value Chains, China, Thailand, Cassava, Agro-commodity Trade

INTRODUCTION

As China's income rises and its industries develop, its' demand for commodities is set to increase (Farooki, 2009; Trinh, 2006). China now leads the world in the imports of many major agro commodities including soy, wood and pork (Trinh, 2006; Kaplinsky and Farooki, 2010). Rapid urbanisation, the replacement of agricultural land by industries, higher per-capita income, and its emerging new middle class have put an upward pressure on its commodity demand.

China has a policy on grain self-sufficiency, which dictates that at least 95 percent of its grain food consumption should be sourced domestically. However, technological innovation has enabled multiple uses of cereal crops in food, feed and fuel production. As China resource and energy needs increases and its appetite for higher protein diet i.e. meat and dairy grows, demand for ethanol feedstock and feed crops also increase. Domestic cereal production has to then be supplemented by importing cereal crops and their alternatives, including cassavas.

This paper is structured as follows. It opens with an introduction of cassava as a commodity and a brief description of the cassava industry in Thailand. It is then followed by a section describing the shift in markets for both value chains. For each of the value chain, there is also a discussion on the firm-level implications of and responses to this shift in markets. Firm level information has been derived from primary information, gathered from the author's interviews from November 2008 to March 2009 with 59 cassava processors in Nakhon Ratchasima Province in the northeast of Thailand. The 59 processors consisted of 31 drying yards, 10 pellet plants and 18 starch factories. Primary data unravel firm-level implications of and responses to external market restructuring.

CASSAVA

Cassava (*Manihot esculenta*) is native to South America and is cultivated for its starchy tuberous roots. Grown exclusively in developing regions i.e. Africa, Latin America, Asia and Oceania, cassava is the third largest source of carbohydrates in the tropics after rice and corn, and is a staple for over 600 million people (FAO, 2002). There are sweet and bitter cassava varieties, depending on the level of toxic *cyanogenic glucosides*. Sweet cassavas are normally used for direct human food consumption; while bitter cassavas are used as feed or further processed into industrial inputs e.g. starches (Vessia, 2007).

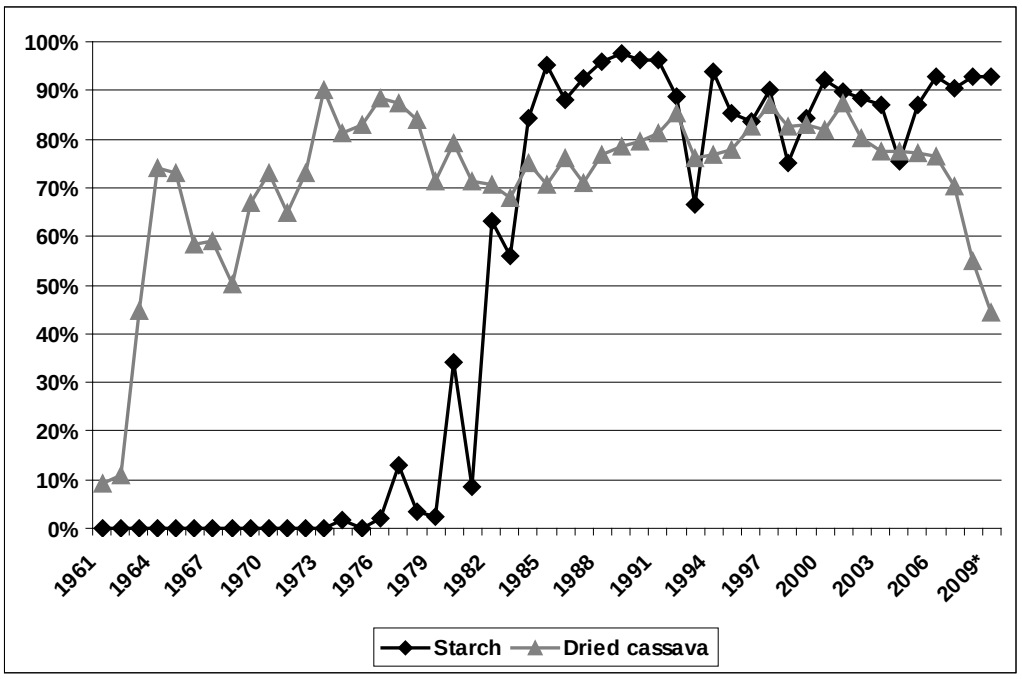
The crop has intrinsic developmental traits. It is low maintenance in terms of physical inputs e.g. fertiliser and farm labour, and thrives on nutrient-poor soil; hence well suited for marginal and capital-poor farmers. The roots could be kept underground without losing nutritional values for up to two years, making it an important food security crop at times of famine and economic hardships (Vessia, 2007). However, once harvested they are perishable and need to be processed within 48 hours. This assures at least the first stage of processing to be done close to the farms, this consequently stimulate local value creation and retainment.

FAO (2009) estimated that out of the 242 million tonnes of cassavas produced in 2009, less than 21 percent was globally traded. This low propensity in cross border trade is due to the crop's bulky and low-value nature, which requires cost-efficient transport infrastructure for the processing industry to be economically viable, something that is lacking in many cassava producing economies. In 2008, global trade in cassava products was valued at $1.124 billion (Kaplinsky et al., 2010).

More than half of the world cassavas are produced in the top five countries: Nigeria,

Thailand, Brazil, Indonesia and the Democratic Republic of Congo (FAO, 2009). At almost 19 percent share, Nigeria is the top producer in 2009. Thailand came second at 13 percent, a significant increase from just 3.5 percent in 1970. Despite only recently becoming the second largest producer, Thailand has long dominated world cassava export across products.. In 2008, it accounted for 80 percent of total global cassava exports at $910 million (Kaplinsky *et al*, 2010). It controlled up to 90 percent of global cassava starch exports and 70 percent of global dried cassava exports, although it has recently lost dominance in the latter to Vietnam (see Figure I).

Figure I: Thailand's Share in World Cassava Exports, 1961-2009



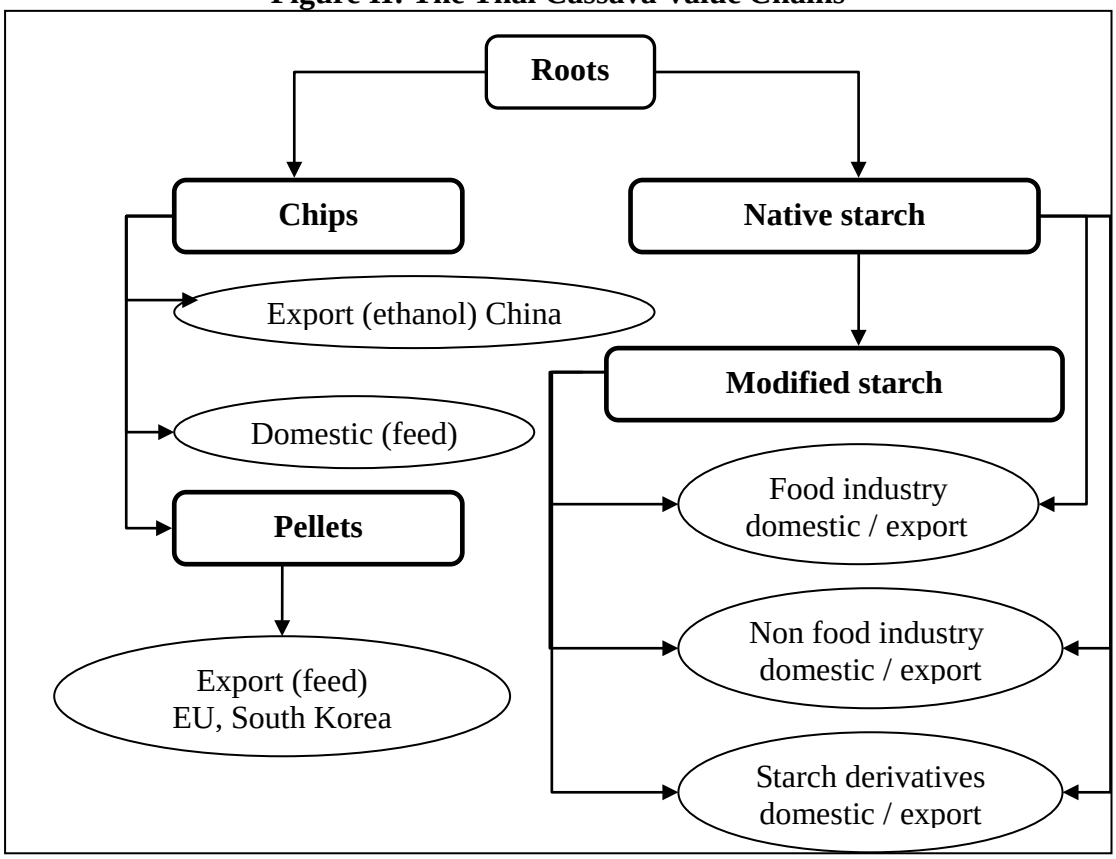
*Source: FAOSTAT, Agriculture TradeSTAT, accessed 13 Nov 2009; *FAO (2009)*

THE CASSAVA INDUSTRY IN THAILAND

Cassava plays an important role in the Thai economy. In 2007, it is Thailand's second most important crop after rice and third biggest agricultural export after rubber and rice (FAOSTAT, 13 Nov 2009). Unlike in other producing countries, cassava is grown in Thailand as an industrial rather than a staple crop.

The Thai cassava industry is very export oriented, with up to two third of total production exported in 2008 (TTSA, 2009). The industry consists of two main value chains: the dried cassava and the starch value chain (see Figure II). Both chains have experienced substantial shift in market towards China in recent years, more so in the former than the latter.

Figure II: The Thai Cassava Value Chains



Source: Tijaja's fieldwork interviews (2009)

The dried cassava value chain comprises of two main products. The first is chips, which are sundried pieces of crudely cut cassava roots. Chips are used as inputs in the animal feed and bioethanol industries. Lower-grade "normal chips" are used as intermediary inputs, sometimes together with starch waste, in pellets production (for animal feed) or as bioethanol feedstock. Higher-grade "clean chips" are used in domestic feed and livestock industry. Clean chips' production involves mechanised

peeling and cleaning of roots prior to chopping and drying. They have lower moisture level, and sand and fibre content than “normal” chips, but cost more to produce and require an additional day of sun drying.

The second product is pellets, produced by pellet plants. Pellets are made out of “normal chips” and/or the waste from starch processing. To make pellets, chips are first ground and steamed, perhaps mixed with starch waste, and moulded into cigarette-shaped pellets. Pellets are then mixed with other feed ingredients to make compound feed, mostly for use in the export markets in large commercial farms.

The starch value chain also comprises of two main products: native and modified starches (and a small quantity of sago). Starches are used in various food and non food industries i.e. sweeteners, paper, textile, MSG, pharmaceuticals, plywood etc, with modified starch feeding into more technologically-intensive ones. Modified starch involves an additional step of processing from native starch, and its production is much more technology, skill and capital intensive than native starch.

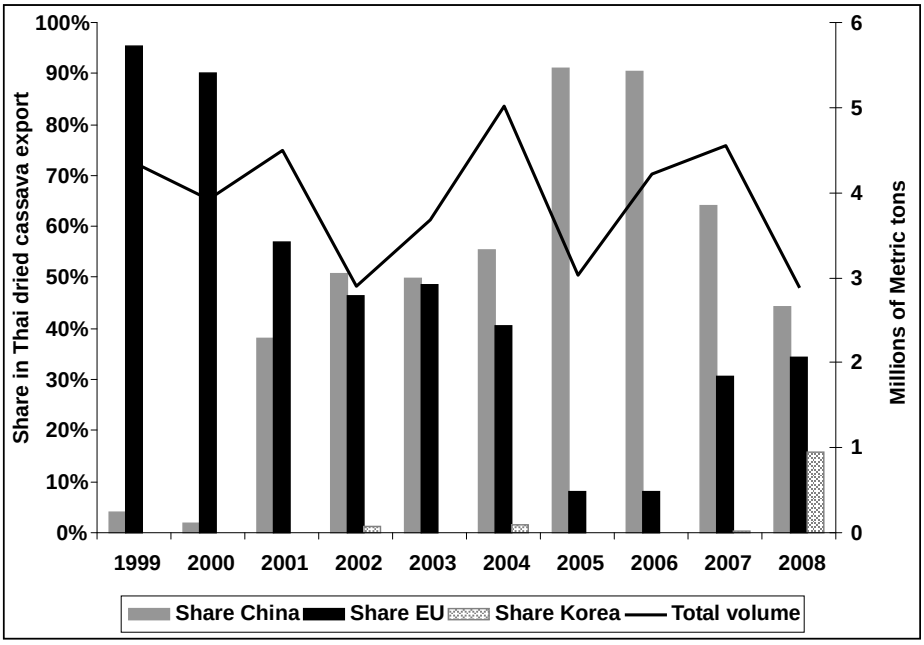
In the starch value chain, producers seem to have more market power and market knowledge than in the dried cassava value chain. Thai starch producers often go on business trips or participate in trade fairs organised by the Thai Tapioca Starch Association (TTSA) to promote their products and also to educate potential buyers on the uses and benefits of using cassava starches. Starch factories would also sell starch waste to the drying yards.

THE SHIFT IN THAI CASSAVA MARKETS TO CHINA

China’s growing demand for dried cassava

The shift in Thai cassava export market to China is most prominent in the dried cassava value chain. For four decades since the mid 1960s global trade in dried cassava was dominated by bilateral trade between Thailand and the EU. China only emerged as a significant player at the start of the decade, but rapidly became Thailand's largest dried cassava market by 2002 (See Figure III). South Korea has also recently emerged as another major market. In 2009, FAO forecasted that China accounted for 87 percent of Thailand's total dried cassava exports; followed by South Korea at three percent and the EU at a mere 0.5 percent, the first mostly chips while the latter two pellets (FAO, 2009).

Figure III: Thai dried cassava export: the shift in destinations



Source: UNCOMTRADE, accessed 03 Dec 2009; TTTA, 2004; TTTA, 2009

Thailand's dried cassava value chain rapidly developed in mid 1960s as a response to the incidental creation of the EU cassava market. This started with the introduction of the Common Agricultural Policy (CAP) in the EU in 1962. The CAP resulted in artificially high domestic cereal prices in the EU, and led to the search by European feed manufacturers for cheaper alternative feed ingredients which resulted to the

importation of dried cassava from Thailand. Thailand initially exported dried cassava to the EU in the form of (normal) chips and since the late 1970s as pellets.

Between 1968 and 1980, cassava export from Thailand doubled every four years. However, this phenomenal growth in exports was soon followed by an equally rapid decline, after a series of trade restrictions and EU policy reforms were put in place from the 1980s and early 1990s (Siriprachai, 1998). The 1992 CAP Reform was the biggest blow and led to a near collapse of the Thai dried cassava industry. By 2005, Thailand's pellets export to EU had fallen to less than 250,000 tonnes, down from its peak of 9 million tonnes in 1989 (TTTA, 2009). Export has never recovered; except for a slight rebound in 2007 and 2008; and was forecasted to have plummeted again to 20,000 tonnes in 2009 (FAO, 2009)

Meanwhile China has been importing chips dried cassava from Thailand since the late 1990s albeit only in small volume. China's imports increased significantly in 2001 due to wheat harvest failure, which left its ethanol and citric acid industries short of feedstock input (OAE, 2006). In just a year, China overtook EU as Thailand's largest dried cassava export market, with 99 percent of Thailand's chips going to China (UNCOMTRADE, accessed 03 December 2009).

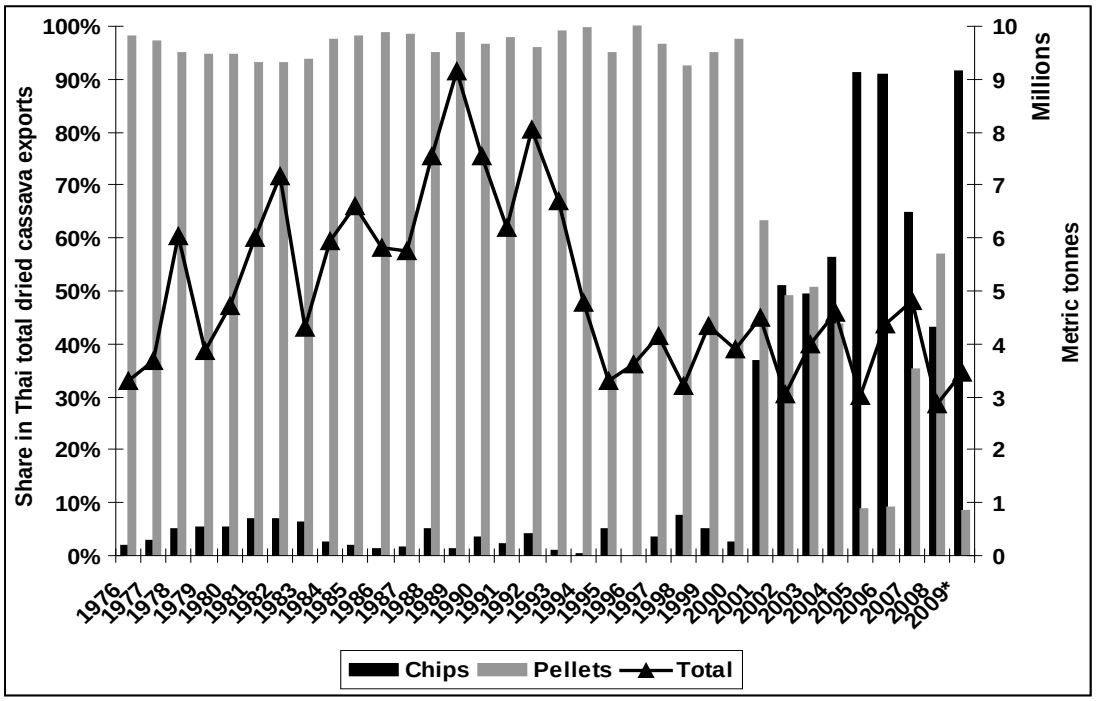
China's demand soared significantly further in 2003 after the implementation of the Early Harvest Program (EHP) under the China-ASEAN Free Trade Agreement. Under the EHP tariffs on agricultural products were eliminated as of 1 October 2003, increasing the competitiveness of Thailand's chips in China. Chips exports to China peaked in 2006 at nearly four million tonnes from just 74,000 in 2000, before temporarily falling back to 1.21 million tonnes in 2008 (TTTA, 2004; TTTA, 2009). However, chips exports were forecasted to bounce back to around three million tonnes in 2009 (FAO, 2009)

China's demand for chips increases as its ethanol and alcohol producers switch to cassava from molasses and corn as. The switch itself is driven by China's own policies. China's grain self sufficiency policy requires up to 95 percent of cereal consumption to come from domestic production to maintain food security and socio political stability, and hence discourages the use of cereal crops for non food purposes e.g. ethanol / alcohol feedstock. In June 2007, the Chinese government suspended the issuance of new licenses for grain-based ethanol plants. The government has also been discouraging the use of molasses due to its adverse environmental implications. These restrictions triggered the growth in the use of cassava chips in ethanol / alcohol and citric acid production. China's chips demand has undoubtedly cushioned the Thai dried cassava industry from the full impact of the collapse of the EU market. However, it has also led to some restructuring of the domestic value chains as discussed next.

Implications on Thailand's dried cassava value chain

The shift in the main market of Thai dried cassava from EU to China was followed by a shift in product forms. For decades pellets were the dominant form of Thailand's dried cassava export, consistently representing over 90 percent of total export volume. But the situation started to reverse in 2001, coinciding with the surge in China's dried cassava imports. By 2005 over 90 percent of Thailand's dried cassava export was in the form of chips. Aside from the temporary reversal in 2008, chips have since become the dominant form of Thai dried cassava exports (TTTA, 2004; TTTA, 2009; FAO, 2009; see Figure IV).

Figure IV: Thai dried cassava export: the shift in product forms



*Source: TTTA (2004 and 2009). *calculated from FAO (2009)*

This shift in product forms could be explained by the different applications of dried cassava in these two markets. In the EU, dried cassava is used in the compound feed industry. The uneven shapes of chips make mechanised mixing with other feed ingredient difficult. Transportation of such bulky commodity to the EU market is costly, giving incentive to the development of a more compact form of dried cassava. Furthermore, the handling if chips at the port is dusty. The EU 1978 environmental regulation called for ways to address this issue. These three factors pushed for the development of pellets, which are even in shapes and sizes, more compact and less dusty. On the other hand, China uses dried cassava as ethanol feedstock, hence uneven shapes and sizes are no longer a concern. In addition, China is located closer to Thailand and thus the cost of pelletisation might not be offset by the savings in transportation.

The other implication of the shift in market is the change in product quality or standards. Different user industries have different quality or standards requirements.

As pellets are used in the EU as feed ingredient, the EU market requires traceability by way of HACCP GMP certification on pellet plants. While China uses chips as ethanol feedstock, so starch content is the most important quality indicator as it determines the amount of ethanol that could be produced from a given amount of roots. Cleanliness and traceability becomes less of an issue. So while the EU market demands HACCP GMP certification, the Chinese markets requires higher starch content of 67% for chips rather than the 65% demanded by the EU for pellets.

The shift in exports from EU to China and hence from pellets to chips, has affected Thailand's relative competitiveness to other suppliers. While Thailand has a strong comparative advantage in pellets production in terms of technology and significant head start in market dominance, it faces more competition in chip production from Vietnam. Lower entry barriers in chip production make the entry of new suppliers easier. Chinese buyers prefer Vietnamese chips over Thailand's, which, because of low labour cost, are normally cheaper and cleaner as the roots are peeled before chipping. FAO (2009) forecasted that Vietnam has overtaken Thailand as the world top dried cassava exporter in 2009.

The growth in demand for chips has triggered many new drying yards to enter the business. Almost a third of the 31 drying yards interviewed only started cassava-drying business in the last 10 years, as a response to positive market outlook due to the rise in China's chips demand. A third of these new entrants used to be or are cassava farmers. The low entry barriers in cassava-drying business, both in terms of capital and know how, enable farmers to functionally upgrade their value chain participation. Furthermore, more than a third of all drying yards have also expanded their production capacity. Nevertheless some drying yards have been facing tough competition from starch factories in procuring cassava roots to make chips. More than

a quarter have been forced to dry only or mostly starch waste and forgo chips making.

Some pellet plants have also benefited from China's growing chips demand. The decline in the EU pellet market has led to almost a half of interviewed pellet plants to either cease production or downsize. Fortunately these pellet plants could easily transform to, or add to their business, chips trading to minimise the impact of EU market collapse. They benefited from their existing network of chips suppliers and, for some, port facilities and export capabilities. Up to 80 percent of pellet and ex pellet producers interviewed are currently involved in chips' trading.

One issue that repeatedly emerged from the interviews was the tendency of some Chinese (chips) buyers to renegade on contract terms. When market price is lower than contract price, some Chinese buyers delay shipping arrangement, leaving the exporters to bear the storage cost and the cost of quality deterioration. Hence, while forward contract is the norm in trading with European buyers, Thai exporters prefer to do spot trading with Chinese buyers. Some even avoid dealing directly with Chinese buyers altogether, preferring to sell through larger exporters.

Not all market actors in the Thai dried cassava value chain opt to supply to China's chips market. Up to 40 percent of pellet producers cope with the fall in EU demand by diversifying to other pellet markets, especially South Korea. Out of 31 drying yards, nearly half specialise in clean rather than normal chips, which are then supplied to the domestic feed market. Research and promotion by universities and research institutes seemed to have some success in promoting the use of dried cassava i.e. clean chips and dried starch waste in domestic feed industry.

China's growing demand for cassava starch

Aside from chips, China's demand for cassava starch from Thailand has also been

increasing. The share of starch in China's total cassava imports from Thailand has grown from under six percent in 2002 to over 27 percent in 2008 (Table I). Starch production involves a higher level of processing and value addition than the dried cassava, hence China's increasing demand for starch challenges on the general claim that China would only demand for raw or minimally processed agricultural commodities.

Table I: Composition of Thai cassava exports to China

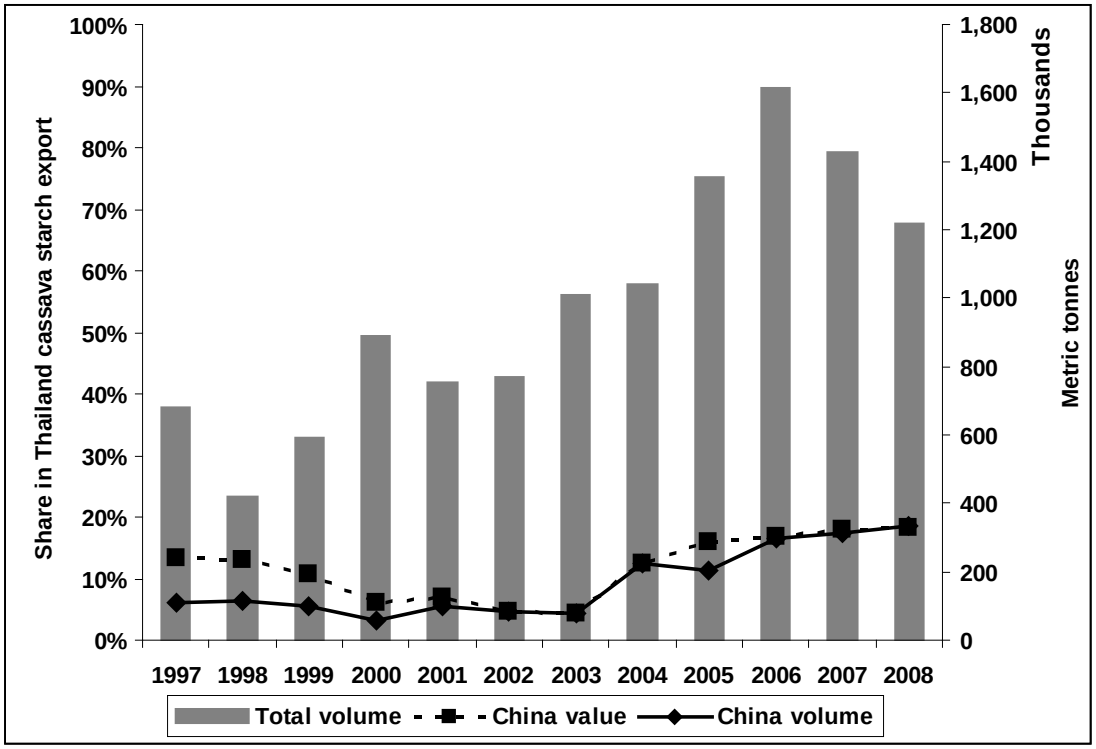
	2002	2003	2004	2005	2006	2007	2008
Total ($m)	**109.02**	**137.44**	**236.74**	**329.87**	**474.81**	**417.62**	**288.30**
Of which is (%)							
Dried cassava	94.10	94.66	90.04	89.44	87.61	83.26	72.57
Cassava starch	5.90	5.34	9.96	10.56	12.39	16.74	27.43

Source: UNCOMTRADE, accessed 26 November 2009

Because of the sheer volume of its demand, China's market share in Thai cassava starch export (in volume) has grown from just 6 percent in 1997 to over 19 percent in 2008 (Figure V). FAO (2009) forecasted that in 2009 China would account for 26 percent of Thailand's cassava starch and flour export.

However along with China's growing demand per unit value of starch exported from Thailand to China has been declining. In 1997 China accounted for 13 percent of Thailand's starch export in terms of value, but only 6 percent in volume (Figure V). This means that previously while China's market share was small, it tended to import higher value starches than average. However, by 2008, the situation was reversed. China accounted for 18 percent of Thailand's starch export in terms of value, and 19 percent volume (Figure V). So while China has become Thailand's largest starch export, it tends to import starches of lower value than the average.

Figure V: Thai cassava starch export: the shift to China



Source: UNCOMTRADE, accessed 07 January 2010

Implications on Thailand's cassava starch value chain

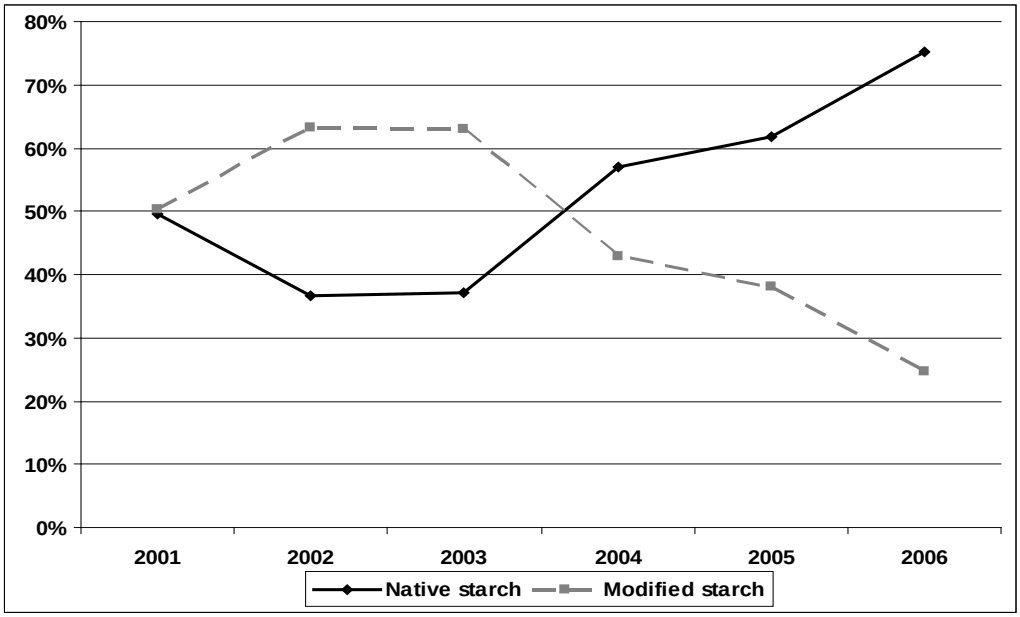
While China has also become the largest export market for Thai cassava starch, its dominance is a lot less pronounced than in the dried cassava market. Nevertheless, the nature of China's starch demand could still have significant impact on Thailand's starch value chain.

Breaking down Thailand's starch export to China, interesting patterns emerged (Figure VI). The share of native starch in Thailand's starch export to China has increased from 50 percent in 2001 to 75 percent in 2006 (TTSA, 2008). While the share of modified starch has been halved from 50 percent to just 25 percent, despite of the near doubling of export volume in absolute terms in the same period, from 42,107 tonnes to 81,929 tonnes (TTSA, 2008; see Figure VI).

This demand pattern is likely to bea reflection of the building of China's own starch modification capacity rather than an actual decline in demand. Modified starch (all

starches, not just cassava) production in China has increased rapidly from just 20,000mt in 1991 to almost 650,000mt in 2006 (Wang, 2002:34; Wang, 2007). Another speculative explanation is that in the past China imported higher value starches to feed into its export-oriented industries targeted at the high income markets. While recent increase in imports is geared towards lower value starches as they were fed into less-sophisticated domestic-oriented industries.

Figure VI: Shares in Thai cassava starch export to China



Source: TTSA (2008)

Interviews with starch factories indicated that Chinese buyers are generally very price-sensitive. The required standards by Chinese buyers might not differ much from others, and hence are usually determined more by their applications rather than country markets. China uses starches mostly in its paper and textile industries; and consequently demand tends to require simpler starches than for example Japanese food industry. China's demand also tends to be more price elastic, as it has more access to alternative products e.g. domestic corn starch.

There was a steady flow of new entrants into Thailand's starch value chain in the past

10 years. Of the 18 starch factories interviewed, almost 40 percent entered as new businesses while less than 45 percent have expanded production capacity. Thailand's starch value chain has much broader market base than dried cassava, in terms of countries and industries, hence only part of this expansion can be attributed to China's growing starch demand. Almost three quarter of starch factories has diversified their market in the past 10 years, and 30 percent planned to do so in the future. The Thai Tapioca Starch Association is the largest cassava starch trade association in the world. It often organises trade fairs domestic and overseas for its members, not only to promote but also to educate potential consumers of the uses and the benefits of using cassava starches.

Thailand responses to China's growing demand for cassava starch vary. Some readily supply to the Chinese market, to make use of economies of scale in production, while others are more reluctant. Firms emphasise the need to be the 'lowest cost producers' to penetrate the Chinese market due to the price sensitivity of this market. China's tendency to import simpler native starches has enabled less high tech starch producers to benefit from this increase in new market opportunities. However, some choose to continue focusing on high end starch markets outside of China e.g. Japan. One factory owner compared the Chinese market to a 'second wife', offering his products to Chinese buyers only when there was leftover stock, because he knew he would get lower prices.

This raises the question of whether China's demand for high value starches will increase as its industries and markets become more sophisticated. Furthermore should that happen, where will China source them from. Will China have developed its own modification capacity by then? Will Chinese buyers be less price-sensitive? Answers to these questions require further research on China's starch industry and market.

HOW ABOUT OTHERS?

China's current demand for Thai cassava is concentrated in (normal) chips as ethanol feedstock and (native or low value) starches. The future of Thailand's dried cassava exports to China is bright as China's industrial and household energy demand and the global trend towards greener energy continue to increase. However in the end demand for ethanol feedstock would depend on world oil price, and the relative competitiveness of Thai cassava chips to other feedstock and to other suppliers. Furthermore, China's recent lowering of alcohol and ethanol tariffs from 30 percent to 5 percent, might also significantly transform its ethanol demand from chips as feedstock to cassava-based alcohol/ethanol in the future (Niu and Miles, 2009).

The animal feed market in china, worth over 72 million tonnes per year, has also remained relatively untapped (Gill, 2006). This could be another possible future area of growth for Thailand's dried cassava value chain, be it in the form of chips, starch waste or pellets.

CONCLUSIONS

China has grown and will continue to grow in importance as the main market for Thai cassava across products. As market shifted from the traditional 'north' to China, the nature of demand has also changed. China tends to demand for lower processed or lower value products from both the dried cassava and the starch value chains, which in turn affected the domestic cassava value chains in Thailand.

Dried cassava is imported into China from Thailand as normal chips instead of pellets. While the EU uses dried cassava as feed ingredient, China uses it as ethanol feedstock. The European feed industry is concerned with the compactness and

uniform shapes and sizes of pellets, while China is more concerned with the starch content. Standard certification is less of an issue for China, while the EU requires HACCP GMP certification to ensure traceability. China's growing chips demand has facilitated new entries into and expansions in the drying yard business; allowing for more inclusive value chain participation including farmers and small capital owners. It has also provided new business opportunity for pellets producers and / or exporters in chips trading, helping them to cope with the collapse in the EU market. However not all dried cassava suppliers in Thailand chose to respond to China's chips demand. Some pellet plants prefer to diversify to other markets, notably South Korea, while many chips producers choose instead to supply to the domestic feed market.

Whilst China's demand for dried cassava is unlikely to decline in the near future, competition for cassava roots between the dried cassava and the starch value chains means that a rapid increase in chips demand might crowd out input availability for the starch value chain.

China's demand for cassava starch has also been growing. China is now Thailand's largest starch export market, accounting for about a quarter of total exports. However, a closer look at China's starch import composition reveals that it has been increasingly importing lower value / native starches. Starch producers in Thailand vary in their responses to China's growing demand. Some are keen to utilise the economies of scale in production, while others prefer to focus on high end markets outside of China.

As China's starch market becomes more sophisticated, it is possible that its demand for higher value native and modified starches will increase too. Nevertheless, it might not change the price-sensitive nature of this market. Furthermore, China might decide to source from its own growing modified starch industry or source native starch from

other suppliers i.e. Vietnam. The ability of Thai starch producers to secure market share in China would depend upon their relative competitiveness to other sources of starch and other cassava starch suppliers, including native starch producers in Vietnam and modified starch producers in China.

In sum, the shift in market to China poses both opportunities and challenges to domestic actors in both value chains. In the end the onus is on the domestic value chain actors to decide on their strategy in global value chain participation. On the one hand, Thailand has shown how its cassava industry was able to secure increasingly market share in China. On the other, the case study has shown that China tends to demand for the less processed or lower value products from the two cassava value chains. In the meantime industry stakeholders in Thailand have also taken proactive action to diversify their market and industrial users' base. While many are keen to capture growing market opportunities in China, others might have a different market positioning / targeting strategy. Lastly, Thailand might have greater market power than other cassava producers due to its long term dominance in global cassava exports and leadership in cassava processing technology.

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