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WPS5206

Policy Research Working Paper 5206

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February 2010

Policy Research Working Paper 5206

Abstract

Rapid economic growth in China has boosted its demand for commodities. At the same time, many commodity sectors have experienced declining demand from high-income northern economies. This paper examines two hypotheses of the consequences of this shift in final markets for the organization of global value chains in general, and for the role played in them by southern producers in particular. The first is that there will be a decline in the importance of standards in global value chains. The second is that there will be increasing constraints in the ability of low-income producers to upgrade to higher value niches in their chains. Detailed case studies of the Thai cassava industry and the Gabon timber sector confirm both these hypotheses. It remains to be seen how widespread these trends are across other sectors.

This paper—a product of the DFID supported Global Trade and Financial Architecture (GTFA) project—is part of a larger effort to explore the effects of the world economic crisis on global value chains. The authors are grateful to Olivier Cattaneo and Cornelia Staritz for helpful comments on an earlier draft. Views expressed are the author's alone and not necessarily those of the World Bank or its Executive Directors, nor the countries they represent, nor of the institutions providing funds for this research project. Policy Research Working Papers are also posted on the Web at http://econ.worldbank.org. The authors may be contacted at r.kaplinsky@open.ac.uk. More information about the Open University Commodities Programme is available at www.commodities.open.ac.uk.

What Happens When the Market Shifts to China? The Gabon Timber and Thai Cassava Value Chains

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Keywords
Global value chains, China, Thailand, Gabon, Cassava, Timber

JEL codes:
F13, F14, F15, F16, F21, F23, L22, L23, L24, L70, L73, M11, M14, O13, O14

1. HOW DOES DEMAND AFFECT THE RATE AND NATURE OF GROWTH?

Until the late 1950s, economic growth was largely explained by the quantum of available labor, land and the investment, and growth was assumed to occur at the extensive margin. High savings-investment rates were at the center of the Harrod-Domar family of growth models which informed development policy in the immediate post-war period. More recently, growth theory has identified the importance of changes in the quality of investment, increasingly shifting the focus of attention in growth models from the extensive to the intensive margin. Both the emphasis on the extensive and the intensive margin reflect a preoccupation in growth theory and development policy with factors determining the augmentation of supply.

1.1. Market Demand and the Growing Importance of Standards

In recent years, we have become increasingly aware of the role which demand plays in economic growth, and its derived impact on the growth of supply capabilities. It is widely accepted that the volume and rate of demand growth contributes to the growth of productivity and capabilities.[1] But, the *nature* of demand also has a significant impact on capabilities, and the returns to alternative patterns of production.

Around the late 1960s, there was an important transition in final markets in the northern economies (Piore and Sabel, 1984). Once post World War Two reconstruction had been achieved and basic needs of most consumers had been met, consumers became increasingly discerning about the products they consumed. They demanded higher levels of quality, much greater product differentiation and faster rates of product innovation. In the context of this change in the pattern of demand, the ideal archetype in production organization moved from mass production to mass customization (Pine, 1993), in which producers developed the capabilities to meet different critical success factors (CSFs) in proliferating and dynamic market segments. Variety and flexibility – with little trade-off in costs – became the name of the game in competitive production.

A direct consequence of this search for low-cost flexibility was a transition in production organization, from “just-in-case” mass-production to “just-in-time” lean production (Kaplinsky, 1994; Womack and Jones, 1996). Coupled with the drive by firms to concentrate on their core competences this meant that lead firms were required to take responsibility for the systemic efficiency of their increasingly global value chains (GVCs) (Gereffi, 1994). One important component of the tool-box which this entailed was the development of standards in production, often usefully summarized as QCD. The Q stood for standards over quality (increasingly measured in parts per million), the C for cost (often, annual reductions in price paid to suppliers) and D for delivery (more frequent deliveries in smaller batches).

Most of these standards were firm-specific or driven by organizations reflecting the interests of the corporate sector, such as the cross-sector ISO9000 quality procedures, and subsequently ISO14000 environmental standards. By the end of the twentieth

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[1] For example, Verdoorn’s Law argues that rapid market growth allows for an increase in scale which both increases productivity and spurs innovation.

century, these private sector standards had become an integral component in most GVCs feeding production into global markets, particularly for intermediate and final consumption goods characterized by variety.

A further development of standards reflected a different process, one in which the key drivers were final consumers and the state concerned with consumer welfare, rather than private sector firms searching for competitive advantage. In some cases, standards were set by governments to promote product safety, particularly in the food sector. But, increasingly, consumer organizations became concerned with the processes involved in producing products to meet their needs, requiring fair returns to producers (Fairtrade) and organic certification.

Figure 1 summarizes the growing complexity of these standards, covering both production and processing, and involving various types of codification including both private and public sectors.

Figure 1: Drivers of Standards over Process and Product

	By firms	***By governments***	***By civil society***
Product	Quality standards - such as permitted parts per million defects	Food hygiene standards – such as lead content in toys	Organic products
Process	Quality control procedures – such as ISO9000; Frequency of on-time delivery	Hygiene standards – such as Hazard Analysis and Critical Control Point conformance (HACCP); Traceability of pesticide content	Sustainability standards – such as FSC (Forest Stewardship Council) (timber); Child labor standards

1.2. Markets, Market Entry and Upgrading

In the long run, and particularly in a world of intense competition (as in the recent era of globalization), growth arises from the accretion of capabilities, including the capacity to upgrade processes and products. But in a world of growing outsourcing of production to lower cost producers, a key upgrading capability is that, which enables the firm (and the economy) at large to change its functional insertion in global value chains, perhaps moving into new and more complex stages of processing, or from physical transformation to design and marketing. The shift to non-transformation links in the chain is especially important in GVCs producing differentiated products, since the returns generated in the disembodied links of the value chain are generally higher than those arising in the physical transformation of inputs into outputs, or in the final delivery of services to the consumer. Often, as in Figure 2, there is a hierarchy in this process of upgrading as firms move from assembly, to manufacturing-transformation, to design and to branding (or often a combination of these functions). In mature chains, when firms have developed capabilities, they may also upgrade by moving to a new chain.

Figure 2: Is There a Hierarchy of Upgrading?

	Process Upgrading	Product Upgrading	Functional Upgrading	Chain Upgrading
Trajectory				
Examples	Original equipment assembly (OEA) Original equipment manufacture OEM	Original design manufacture	Original brand manufacture	Moving chains – e.g. from black and white TV tubes to computer monitors
Degree of disembodied activities	Disembodied content of value added increases progressively			

Source: Kaplinsky and Morris, 2001.

1.3. Southern Drivers of Growth

It follows from the discussion in Sections 1.1 and 1.2 (but see Kaplinsky and Farooki, 2010 for an extended discussion) that, by hypothesis, global value chains feeding into low-income markets are likely to have different characteristics to those feeding into high-income markets. To take the two issues addressed above – standards and upgrading – we can develop this hypothesis in the following terms.

- Standards are driven by differentiation of consumer tastes so that lead firms have to govern their extended chains to ensure the conformance required to achieve differentiation at low cost. They are also driven by government health and safety considerations, and by civil society concerns with equity and the environment. In each of these cases, it is less likely that these demands will be as evident in value chains feeding into low-income markets. Figure 3 gives some examples of these variant drivers of standards in high and low-income economies, distinguishing between standards driven by firms, governments and civil society, and those addressing products and processes.

Figure 3: How Important Are Standards Likely to Be in Value Chains Feeding into Low-Income Markets?

		Firm driven standards	Government driven standards	Civil society driven standards
Product	***High-income countries***	Quality standards - such as permitted parts per million defects	Food hygiene standards - such as lead content in toys	Organic products
	China, India	Low emphasis and weak enforcement	Low emphasis and weak enforcement	None, or very weak
Process	***High-income countries***	Quality control procedures – such as ISO9000; Frequency of on-time delivery	Hygiene standards – such as Hazard Analysis and Critical Control Point conformance (HACCP); Traceability of pesticide content	Sustainability standards – such as FSC (Forest Stewardship Council) (timber); Child labor standards
	China, India	Low emphasis and weak enforcement	None, or very weak	Low emphasis and weak enforcement

- Producers inserted in global value chains participate in an international division of labor. Firms will jockey for position in this chain, seeking to command a space which maximizes the rents which are made possible by their capabilities and the economy in which they are located. Insofar as low-income economy firms engage in a chain including firms from high-income economies, there are a number of areas in which win-win specialization outcomes can be anticipated. Figure 4 identifies four such areas – southern firms have low labor costs, relatively underdeveloped technological capabilities and operate in countries which are relatively insensitive to environmental externalities. Conversely, northern firms pay high wages, specialize in technologically-intensive activities and work in countries with weak environmental and lower quality working environments. Thus there will be a range of activities where southern firms will not compete with northern firms in their chains whereas, by contrast, when trading with southern partners, there is likely to be much more scope for competitive win-lose outcomes.

Figure 4: High and Low-Income Commodity Importing Economies – Complementarity and Competition with Low-Income Commodity Exporting Economies

	High-income importing economy	Low-income importing economy
Pollution and energy intensity	High preference to outsource to exporting economy	Indifferent to location
Complementary or competitive industrial structures	Complementary – focus on technologies with high barriers to entry	Competitive – importers also have low technology industrial structures
Labor costs	High wages militate against labor intensive processing	Low wages facilitate labor-intensive processing

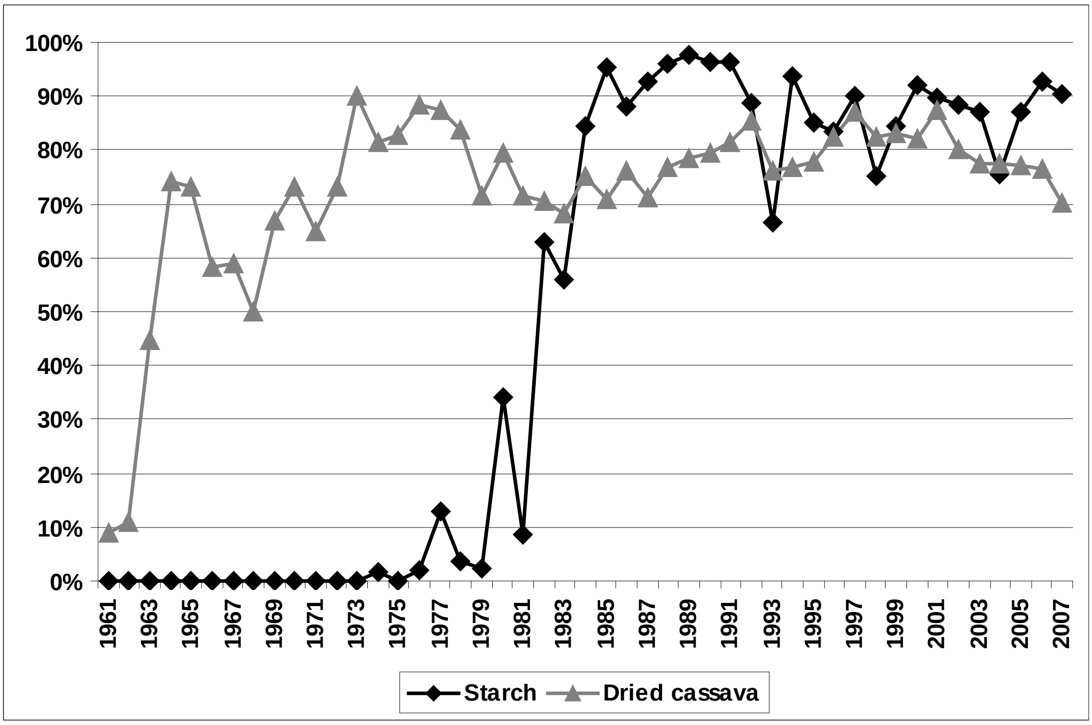
Although these factors may be pervasive across sectors, their intensity will of course differ. Some sectors produce much more differentiated goods than others (organic fair-trade bananas compared to commodity bananas). Sectors and countries also differ in their technological intensity and producers are located in a variety of different forms of operating conditions.

In this paper we explore the examples of two soft-commodity sectors - cassava in Thailand (Section 2) and timber in Gabon (Section 3). Our market reference point is the shift in final market from the high-income EU market to the low-income China market. In both cases we explore how this shift in final market is reflected in the extent and nature of standards incorporated in the value chain, and in the capacity of low-income commodity exporters to upgrade to high value added and more technological complex links in their value chains.

2. THE THAI CASSAVA VALUE CHAIN

Cassava is a widely grown crop globally. The major reason for this ubiquity is that it grows on relatively poor quality land and is relatively drought-resistant, thus serving as a food-crop-of-last-resort in many countries. But it is also an important intermediate product, feeding into the animal-feed, bioethanol and the starch markets. Since raw cassava is poisonous to human beings, bulky and perishable, the trade in cassava necessarily occurs in processed form. In 2008, global trade in cassava products was $1.124bn, and although the largest producers were Brazil and Nigeria, Thailand was the world's largest cassava exporter (Figure 5), accounting for around 80 percent of global trade in both major product families ($910m) (COMTRADE, accessed 26 November 2009).

Figure 5: Thailand's Share in World Cassava Exports, 1961-2007



Source: FAOSTAT Agriculture TradeSTAT accessed 13 Nov 2009

Cassava plays an important role in the Thai economy. In 2007, it was the second most important crop after rice in terms of value and the third after sugarcane and rice in terms of volume (FAOSTAT, Agriculture production data, accessed 13 Nov 2009). At $948m in 2007, combined dried cassava and cassava starch exports were its third biggest agricultural export after rubber and rice (FAOstat, Agriculture trade data, accessed 13 Nov 2009). Unlike other major producers of cassava, there is little domestic direct consumption of cassava as a food product in Thailand, where almost all output is used as an intermediate product in other sectors. In 2008, an estimated 66 percent of all Thai cassavas was exported, 26 percent was utilized domestically and the rest was kept as stock (TTSA, 2009).This represents a somewhat unusual story of an "alien" food crop being introduced into a low-income economy (in this case, dating back to the 1950s) and initially thriving solely as an exported intermediate product used in the food industry in other economies.[2]

2.1. The Cassava Value Chain in Thailand

There are essentially two families of products in the Thai cassava sector (Figure 6). These are the dried cassava value chain and the starch value chain.

<u>The dried cassava value chain</u>, in turn, comprises two product segments – dried chips and cassava pellets.

[2] Thailand's rapid expansion of cassava exports reflected two factors. The first was the well-developed external marketing capabilities of its Chinese trading community. The second was the heavy investment in infrastructure in the north=eastern region during the 1960s and 1970s, designed to counter the political influence of communist insurgents. The north-east has become the major cassava growing region in the country.

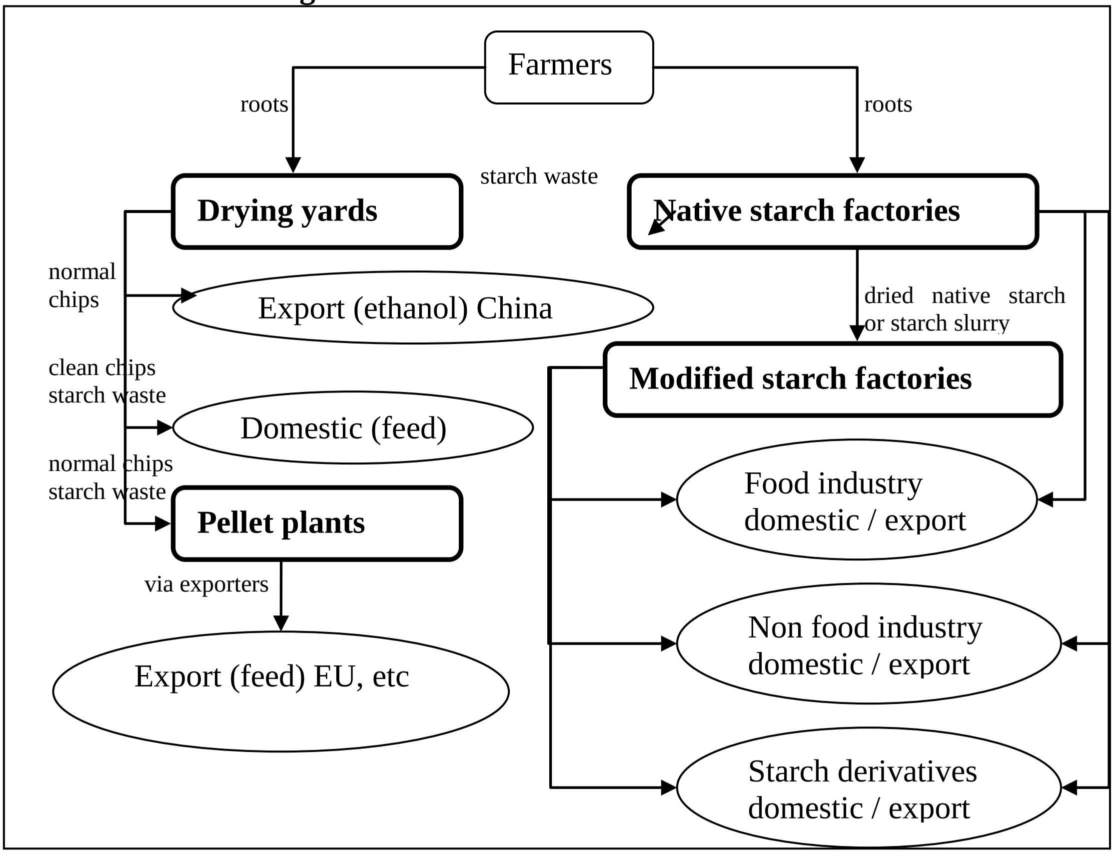
- Cassava chips are inputs into both the animal feeds and biofuels industries, and involves the sorting of root tubers which are then crudely cut and dried in open-air drying yards. Lower-grade "normal chips" are fed into the cassava pellet and bio-fuels industries. The higher-grade "clean chips" are used directly as domestic animal feed, but require the peeling and cleaning of tubers, necessitating rudimentary forms of mechanization (using rotating drums or a screen filter), and an additional day of drying. They have a lower sand and fiber content than "normal" chips

- Cassava pellets process "normal chips" and/or low grade wastage from the starch industry. These inputs are ground and steamed, perhaps mixed with starch residue, and then molded into pellets. The manufacturing process embodies some limited scale economies,[3] and more skilled labor and capital than is required in the production of either clean or normal chips.

The starch value chain also comprises two sub-products - "native" and "modified" starch (although a small quantity of sago is also produced). These starches have industrial uses, with modified starch feeding into more technologically-intensive value chains. Modified starch involves a further step of processing after the production of native starch, reflected in the fact that while roots constitute 70-75 percent of total production cost for native starch, they only account for around 46 percent of the costs of modified starch (Tijaja's fieldwork interviews; Titapiwatanakun, 1994). In addition to being used in other industrial sectors, some of the native starch waste is sold to the pellet plants which combine this with "normal" cassava chips to produce animal feed. The typical starch factory operates at around 850 root-tonnes per day.

3 Typically, an average pellet plant processes around 575 root-tonnes a day, compared to an average of 70 root-tonnes in the drying yards.

Figure 6: The Thai Cassava Value Chains



Source: Tijaja's fieldwork interviews

2.2. Market Requirements for Cassava-Based Products

There are two established and one emerging export markets for Thailand's dried cassava (chips and pellets) – the EU and China, and in recent years Korea. Each of these markets has particular trajectories and requirements. The smaller starch export market is more diversified.

<u>The EU</u>

The origin of Thailand's dried cassava industry can be traced back to the EU's Common Agricultural Policy (CAP). Demand for Thai cassava pellets expanded rapidly after the introduction of the CAP in 1962, where the resulting high domestic cereal price triggered the search by EU feed manufacturers for cheaper alternative feed ingredients. Exports of cassava to the EU expanded rapidly, reaching a peak of almost nine million tonnes in 1989. Initially these involved exports of cassava chips, but for a series of reasons, pellets became the dominant and then the exclusive cassava product exported to the EU. Since dried cassava was used in compound-feed production, cleanliness and uniformity of shape and size were important to ease the large-scale mechanized mixing of dried cassava with other feed ingredients. In addition, the distance between EU and Thailand required less bulky products, favoring pellets over chips. Moreover, the transportation of chips is dusty, and in 1978 EU environmental regulation mandated the introduction of a less dusty form of dried cassava, again favoring pellets over chips. Finally, as cassava pellets are used in feed production, imports are governed by the EU farm-to-fork policy, which requires traceability. HACCP and GMP certification became a mandatory requirement for entry into the EU, and pellet production lent itself more favorably to this form of certification (Box 2).

Box 2: Standards governing production in the Thai dried cassava value chain

Minimum export standards required by the Thai Ministry of Commerce
For both pellets and chips, there are a number of technical export standards required by the Thai Ministry of Commerce (MoC), based on Notification of MoC B.E.2545 (2002) for sale into the domestic animal-feed market. The main ones are minimum starch content of 65 percent, maximum crude fibre of 5 percent, maximum moisture of 14 percent, maximum sand of 3 percent, and free from foreign materials. However, despite these export standards, some exports (including residue pellets exports to Korea) are shipped to a lower starch content (see below).

Standards governing product entry into the EU
EU 'farm to fork' policy, introduced in 2000 requires the traceability of products used in food and feed production. Compliance for traceability and hygiene requirements is obtained through HACCP and GMP certifications on the pellet plants.

- HACCP ("Hazard Analysis Critical Control Point") certification is required as cassava pellets are part of the animal feed-food chain.
- GMP (”Good Manufacturing Practice”) relates to the sanitary and processing requirements necessary to ensure the production of wholesome food.

The requirement for HACCP is based on European Council Directive 89/397/EEC of 14 June 1989 on the official control of foodstuffs, and Council Directive 93/43/EEC of 14 June 1993 on the hygiene of foodstuffs. The HACCP system has to be implemented in relation to products and production processes.

Standards governing product entry into China
No official standards govern product entry into China. However, since cassava chips are used as a biofuels feedstock, Chinese buyers customarily specify a 67 percent starch content compared to the 65 percent level required to meet Thai Ministry of Commerce export standards. This also tends to be higher than the starch levels required by EU and Korean buyers where cassava exports are sold to the animal-feed market.

Standards governing product entry into Korea
No distinct standard certification is required for entry into the Korean market, but there are technical standards specified by buyers (notably a 55 percent starch content).

However this attractiveness of Thai cassava as an animal-feed input for EU livestock producers was undermined by a series of trade restrictions introduced in the 1980s and early 1990s, and then particularly by the 1992 reform of the CAP. EU domestic cereals became increasingly competitive with cassava pellets. By 2005, pellets export to the EU had collapsed to 250,000 tonnes, compared to a peak of over nine million tonnes in 1989 (COMTRADE, accessed 26 November 2009; TTTA, 2009) and price pressure grew. In 2008, pellets exports to the EU had regrown to 989,000 tonnes, still only ten percent of the 1989 peak (COMTRADE, accessed 03 December 2009).

China

The demand for imported cassava chips into China reflects the related desire by the Chinese government for food self-sufficiency, the growth in the demand for meat by consumers, and the development of its bio-fuels sector. As we saw above, Chinese policy privileges the production of foodgrains for domestic consumers, which means that the requirements for animal feed and feedstock for bio-fuels have increasingly had to be met via imports. This has led to the growing importation of soya products from Latin America and cassava from Thailand. Alternative feedstocks into biofuels such as molasses have been discouraged due to environmental concerns (OAE, 2006).

The bulk of Thailand's cassava exports to China occurs in the form of dried cassava (cassava chips rather than pellets), and is used as an input in the production of biofuels (Table 1). These imports began at a small scale in the mid 1990s, but grew rapidly in the 2000s, following a wheat harvest failure in 2001 and the liberalization of trade barriers in agricultural products under the China ASEAN Free Trade Agreement (FTA) in 2003. The Early Harvest Programme (EHP) of this FTA necessitated the removal of a six percent tariff previously imposed by China on Thai cassava products, boosting their price competitiveness.

Table 1: Thai Cassava Exports to China (millions US$)

	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 (%)							
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: COMTRADE, accessed 26 November 2009

China's demand for starch as an intermediate input into non-food industries has increased rapidly in recent years and the share of starches in cassava imports from Thailand grew from only six percent in 1998 to 27 percent in 2008.

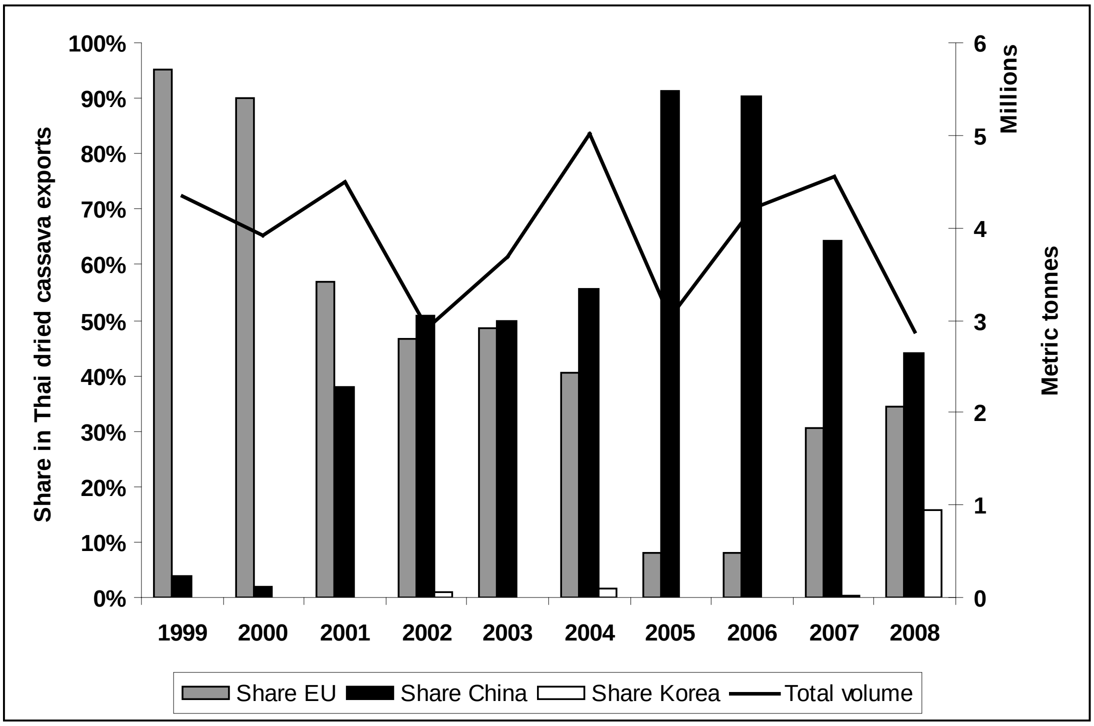
Korea

South Korea mostly imports residue pellets made out of starch waste with a low starch content of 55 percent, compared to the pellets imported by the EU, which are made mostly (70% to 80%) from chips and which has 65 percent starch content. Korea is a very new entrant into the Thai export market, importing virtually nothing until 2007, and then taking 16 percent of dried cassava imports (mostly low-grade i.e. residue pellets) in 2008.

2.3. Changes in Market Destinations and Product Composition

Two major changes can be observed in the export composition of Thai cassava products. The first is the change in destination. The Thai dried cassava industry– essentially a "creation" of the EU CAP after 1962 - was potentially devastated after the reforms to EU agricultural policy in the early 1990s. This reform of the cereal price support system reduced the price competitiveness of cassava pellets imports as an animal-feed. Fortuitously for the Thai industry, the Chinese market began to grow rapidly, soon after the EU market was falling. This changing balance in export destination is shown in Figure 7. Total export volume hovered around 4m metric tonnes during the 1990s, but the share of the EU fell from almost 95 percent in 1999, to less than ten percent in 2005, subsequently reviving somewhat to around 30 percent in 2008. The share of dried cassava (pellets) exports to Korea grew rapidly from merely two percent in 2004 to 16 percent in 2008 (COMTRADE, accessed 03 Dec 2009, TTTA, 2004 and 2009).

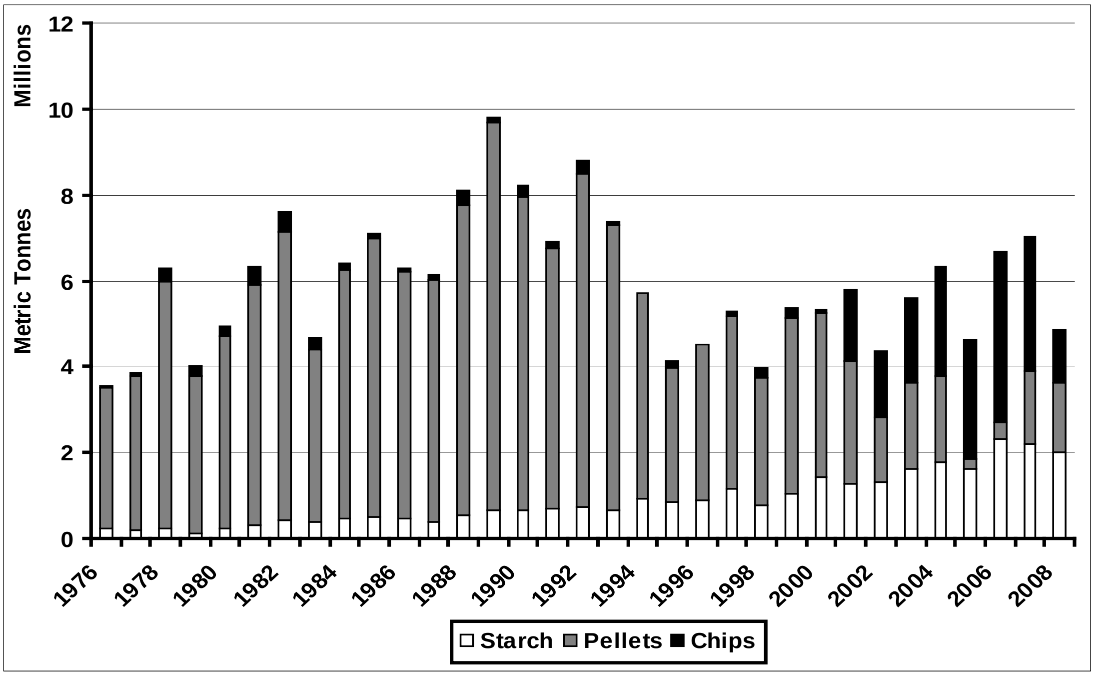
Figure 7: Thai Dried Cassava Export: The Shift in Destinations



Source: COMTRADE, accessed 03 Dec 2009, TTTA (2004 and 2009)

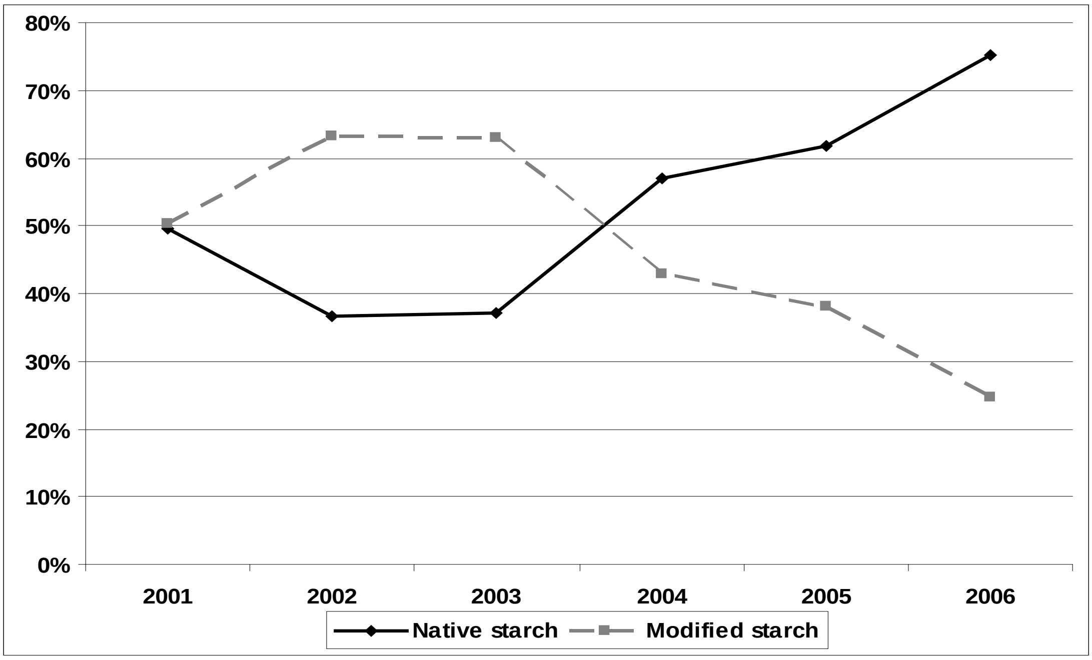
Given different demand patterns in the EU and China, this shift in export destination saw associated changes in the product composition of Thai cassava exports (Figure 8). The major change has been from pellet to cassava chip exports. But an important subsidiary change in Thai cassava export has been the growth of starch exports to China. This grew from six percent of Thailand's cassava exports to China in 2002 to 27 percent in 2008. However, within starch exports to China, there has been a marked shift from modified to native starches (Figure 9).

Figure 8[4]: Thai Cassava Export Composition (Volume of Final Products)



Source: TTTA (2004 and 2009)

Figure 9: Shares in Thai Cassava Starch Export to China



Source: TTSA (2008)

4 There are major differences in the data on production and trade provided by the TTTA and COMTRADE. To facilitate a comparative analysis of Thai export trade we have used COMTRADE as a data source on exports. But since COMTRADE data does not distinguish between pellets and chips, TTTA is used a the source of the product composition of dried cassava trade.

2.4. Consequences

What have been the consequences of these shifts in the related market and product composition of Thai cassava exports over the past decade? Here it is helpful to distinguish between dried cassava exports and starch exports.

Dried cassava exports

The transition from pellets to chips has essentially knocked out a stage of processing. Chip production is a labor-intensive operation occurring in open-air drying yards – the raw cassava is cut, sorted, placed in the sun to dry and then aggregated and exported in bulk containers. Pellet production builds on cassava chip production, adding value by steaming and molding the semi-processed cassava chips in a factory. It is an inherently more technologically complex operation, involving greater operational and managerial skills, not as a substitute to chip production, but as a complement to chip production. This change in product therefore represents a move down the technological chain, and at the margin pushes Thai producers backwards into agricultural rather than manufacturing comparative advantage.

This has implications for factor utilization. Table 2 simulates the employment and capital costs which would result if all of Thailand's cassava production in 2008/2009 (29 million tonnes of cassava roots) were to be exported as either chips, or pellets or starches (as reflected in the current mix of exports). It shows that the additional stage of pellet production over chip production would lead to an additional 9,568 jobs (an increment of 52 percent in employment), but at a higher capital cost of $6m (increasing capital costs by 30 percent). The capital cost per job created in pellet production is only $627. It would also add an additional 168 production units, contributing to the diversification of entrepreneurship and to the potential geographical diversification of production.

Table 2: Factor Utilization and Number of Establishments If All Cassava Were to Be Produced as Chips, Pellets or Starches*

	Chips	Pellets (incl. chips)	All starches
Employment	18,281	27,849[5] (of which 9,568 in pelletization)	29,734
Capital cost $m)	19.97	25.96	44.73
Number of firms	1,373	168 pelletization plants 1,373 drying yards	114

Source: *Capital cost calculated from Roonnaphai (2006); all other data from Tijaja's fieldwork interviews.

A further consequence of the transition from the EU-pellet market to the Chinese cassava market is a removal in the role of standards in production processes and in products. As we saw in Box 2 above, cassava chips exported to China are only required to have a minimum starch content. By comparison, pellet exports to the EU are required to satisfy demanding EU farm-to-fork GM and HACCP standards. Arguably, the achievement of these standards requires more sophisticated managerial

5 Assuming all pellets made out of chips. In reality many pellet factories also use starch residue as an input.

processes and higher labor skills, contributing to the growth of capabilities in the Thai economy.

Finally, there are knock-on effects which can be broadly understood as value chain governance issues. Pellets exports to the EU occurs in bulk and in long-haul 50,000 tonne ships and are controlled by four northern-based commodity traders (including Cargill and Toepfer) who assemble consignments of 6,000-7,000t from individual Thai exporters.[6] These exports occur mostly through long-term forward contracts which provide a predictable income stream for producers and local aggregators. By contrast, in general chip exports to China are sold on a spot-price basis, and provide for far less predictability since when prices fell suddenly in 2008, many Chinese importers reneged on agreed prices. As a consequence, many Thai firms continue to supply to the EU, even though margins on this trade have fallen in recent years as the changing agricultural price support system in the EU has led to increasing price competition from other animal feeds.

Starch exports

If the transition from the EU pellets market to the Chinese chip market represents a downgrading of value addition and capability-building, the same results are not true when we compare Chinese demand for starches with EU demand for pellets.

Starch production is considerably more technologically intensive than is either chip or pellet production. This is particularly true in the case of modified starches – as we saw above, modified starch involves considerably greater processing than does native starch. Hence in this case, the transition from the EU to the Chinese market would be reflected in an increase in technological complexity and skill requirements, greater than that involved in the jump from cassava chip to pellet production. Moreover, it would lead to an increase in around seven percent in total employment, since the packaging stage in starch production is particularly labor-intensive, as well as a considerable increase in skills. This increase in employment would, however, come at a considerable capital cost, with a more than doubling of investment over chip production (123 percent, an additional $25m), a 72 percent increase ($18.8m) over pellet production and a capital cost per job on $2,162, still comparatively low by contemporary industrial production, but more than three times to cost per job in pellet production.

So, at one level, the transition from the EU pellet to the Chinese starch market might suggest an augmentation of capabilities. However, within starch production, there has been an important shift in recent years which mirrors the pellet versus starch story. That is, whereas Chinese starch imports from Thailand comprised around a 50:50 split between modified and native starches in 2001, the share of the more processed modified starches produced in more technologically complex production processes had fallen to only 25 percent in 2006 (TTSA, 2008). China's declining demand for modified starch might reflect the building of China's own starch modification capacity rather than a decline in demand. Modified starch (made from all starches, not just cassava) production in China has increased consistently from just 20,000t in 1991, to 60,000t in 1994, 330,000t in 2001 and to almost 650,000t in 2006 (Wang,

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[6] Thai 'exporters' to EU are actually just assemblers, they only handle paperwork on the Thai side, port handling and off and on loading from lighters (small boats) to big long haul vessels, which are normally organised by the 4 major northern-based agricultural commodity traders.

2002:34; Wang, 2007). If this trend continues, Thailand might be relegated to a supplier of native starch, with the more sophisticated modification taking place in China. The Thai industry *hopes* for a more complex future, with premium grade native starches and the most complex modified starches being produced in Thailand and intermediate grades of modified starches produced in China. On the basis of past trajectories, however, their ability to achieve this outcome must be in doubt.

3. GABON'S TIMBER VALUE CHAIN

The development of timber and timber-related sectors tends to be one of the primary stages of industrial growth, partly because timber-products (such as furniture and housing) have high-income elasticities of demand at low levels of income, partly because the timber related sectors are labor intensive (and hence encourage production at low wage levels), and partly because timber-processing is closely related to the agricultural sectors which dominate low-income economies.

The trajectory of the timber sector mirrors this transition in macroeconomic structure as depicted in the ”Forest Transition” model (Grainger, 1995; Mather, 1992; Mather and Needle, 1998; Rudel et al., 2005), During the *pre-industrial phase*, forests in the now mature northern economies were predominantly used for grazing, the collection of fodder, fuelwood and non-wood forest products, as well as for timber (Farrella et al., 2000; Mather, 2001). Until the 18th century, European forests were a hybrid of agricultural and timber production. During the following *industrial phase* trees were 'mined'. But as forests were depleted, remaining forest areas increasingly required more management. This led to new forms of ownership, with privately owned enclosures replacing communal forests (Humphreys, 2006; Mather and Needle, 1999). For most of the 19th and 20th centuries forests in Europe and North America were “industrialized” and the timber was fed into related industries. As a result of timber shortages in Europe (and later its 'newly depleted' outposts in North America), colonies in Africa and Asia were drawn on to fill the domestic wood gaps. Colonies were often treated as so-called resource taps (Jorgenson, 2008).

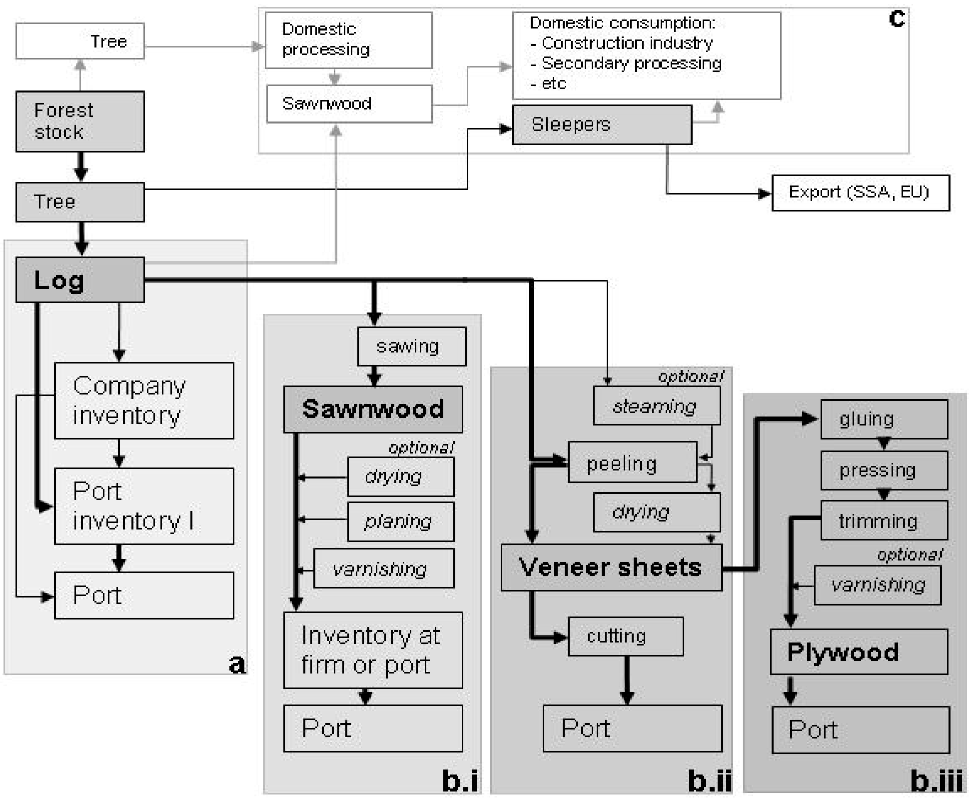
After the 1950s, northern forestry industries moved into the *post-industrial phase.* Technological change in agriculture led to yield increases, making land available for forest expansion (Kauppi et al., 2006; Rudel et al., 2005; Victor and Ausubel, 2000). At the same time, societal perspectives on the functions of forests began to change, and an increasing affluent urban population exerted pressure on domestic forest management to cater to their needs of recreation and regeneration. They also focused on the need to avoid the loss of biodiversity in forests (Bazett, 2000; Nilsson, 1999), and in recent years have become increasingly concerned that deforestation will lead to the erosion of the carbon-sinks, which mitigate against climate change.

In southern economies, much of the tropical deforestation of the late 19th and the 20th centuries can be attributed to export-directed logging activities as wages in northern economies grew and as they ran out of sustainable forests. The overwhelming majority of logging took place through an expansion of the extensive margin, with little attention being placed on sustainable cultivation. Forests increasingly came under state authority with the primary objective of maximizing timber extraction, and forest land was taken by new settlers for agricultural purposes, thereby replacing traditional communal stewardship and common property systems (Humphreys, 2006; White and Martin, 2002).

3.1 The Forest Value Chain in Gabon

Situated on the West Coast of Africa, Gabon is a resource-rich economy with relatively high levels of per capita income, currently around four times the SSA average. It is a major exporter of oil, with a population of only 1.5m. Gabon possesses more than 200,000km^2 of forests, as well as extensive deposits of manganese and iron ore which are only just being opened up for exploitation. Rents derived from the oil-sector are substantial, and even though they are very unevenly spread, the contribution of non-oil sectors to GDP is small. The forest sector accounts for less than three percent of GDP (Melhado, 2007; OECD, 2009).

Figure 10: Domestic Timber Value Chain in Gabon



Note: Bold arrows symbolize major raw material and product flows.

Gabon's forests are part of the second largest tropical ecosystem after the Amazon, namely the Congo Basin, which covers 1.8m square kilometers, stretching across six countries[7]. In Gabon, nearly 85 percent of its total land mass is covered with forests, making it the second most heavily forested country in Africa (FAO, 2005 and 2007). Gabon is the 13th largest tropical log producer globally, and the third largest log exporter with a share of 16 percent of total exports in 2008 (FAOSTAT, ForestSTAT

[7] Cameroon, Central African Republic, Republic of the Congo, Democratic Republic of Congo, Equatorial Guinea, and Gabon.

data, accessed November 2009). While Gabon's forests are made up of between 300-400 species, one – Okoumé – dominates. Around 70-80 percent of its forests contain Okoumé, and this species only exists in comparatively smaller volumes in parts of Equatorial Guinea, Cameroon, and the Republic of the Congo (ITTO, 2006; UNEP and WCMC). Okoumé is particularly favored due to its easy peeling quality as when fresh it can be peeled without prior steaming. Between 1987 and 1996, more than 70 percent of log exports were Okoumé (Collomb et al., 2000), but since then this proportion has fallen to around half of total exports (SEPBG, 2009).

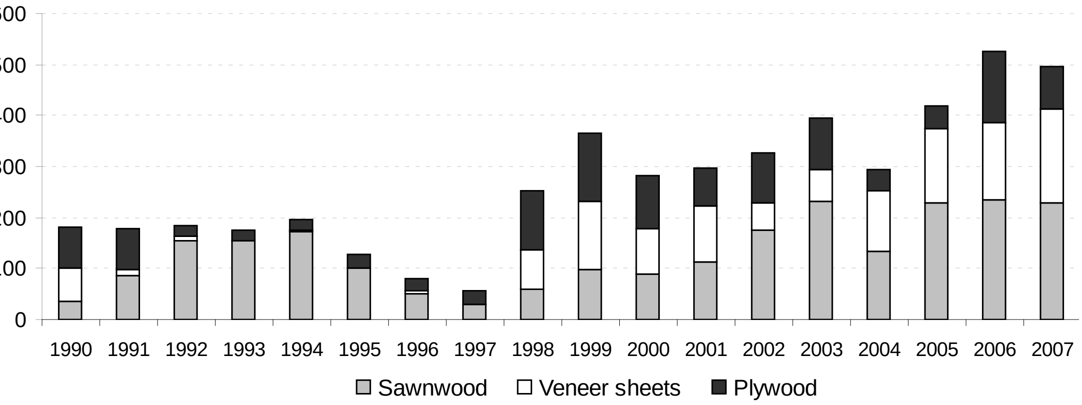
Gabon's timber value chain is shown in Figure 10. A small proportion of harvested trees is converted into finished products which are consumed domestically (c). But the overwhelming bulk is exported either directly as logs (a), or as sawnwood (b.i), veneer sheets (b.ii) or plywood (b.iii). A very small proportion of timber is used to manufacture railway sleepers both for domestic consumption and export.

Until very recently, Gabon's timber sector was unregulated and out of the political focus. But with the growth of environmental concerns about climate change and mounting domestic economic problems, the timber industry has become a subject of increasing regulation, both within and outside Gabon. In the light of decreasing oil production and following pressure from external donors that Gabon regulate this key resource to use it as a primary driver of industrial diversification, the state introduced a sector program for forests, fisheries, and the environment (Programme Sectoriel Forêt, Pêche et Environnement), involving major reforms of the forestry sector (Leigh and Olters, 2006; Söderling, 2006; Wunder, 2003). This included the abolition of the state-owned export monopoly (SNBG) and the introduction of a new legislative framework, the Forestry Code, in 2001. The overall focus shifted from raw material extraction towards the industrialization of the forestry sector through increasing domestic processing of sustainably-managed forests (Methot and Ndongou, 2009). Inter alia, the Forestry Code involves:

- The re-design of the concessionary allocation system using a closed auction system to increase transparency
- The introduction of new types of concessions, with two types of commercial concessions each with a total maximum surface area and a minimum duration of exploitation
- The reform of the tax system to stimulate local processing capacities, and to promote resource transfers to rural populations
- The introduction of local processing requirements to stimulate the processing of at least 75 percent of wood before exporting by January 2012
- Production quotas are assigned to individual companies and tied to the type of concession.

The setting of explicit targets to deepen processing built on the trajectories of a few large European-owned companies, which had established processing plants to manufacture primary processed wood products during the 1990s. Complemented by the requirements of the 2001 Forestry Code to process logs domestically, this has led to a rapid increase in Gabon's production of sawnwood, veneer sheets and plywood (Figure 11). Nevertheless, in 2007 the major share of Gabon's timber (87 percent) was exported as raw logs, and on current trends there is little hope of meeting the Forestry Code objective of 75 percent domestic raw material processing by 2012.

Figure 11: Production Volumes of Selected Wood Products in Gabon (in 1,000 m^3)



Source: Calculated from FAOSTAT ForesSTAT data, accessed November 2009.

The external pressures on Gabon's timber industry explicitly targeted two related objectives. The first, exerted by external donors as a direct pressure on the Gabonese government, was designed to promote greater transparency in the management of the forestry sector in order to facilitate the sustainable management of this key global resource and to widen the distribution of benefits from the exploitation of the forests. The second set of pressures were indirect in that they were not aimed directly at Gabon. They involved a series of standards which global buyers set to ensure the sustainable management of the forests and the legality of wood products that they sourced. This, as we will see below, led to a combination of both private and public standards governing the procurement of wood from Gabon and other sources of tropical hardwoods.

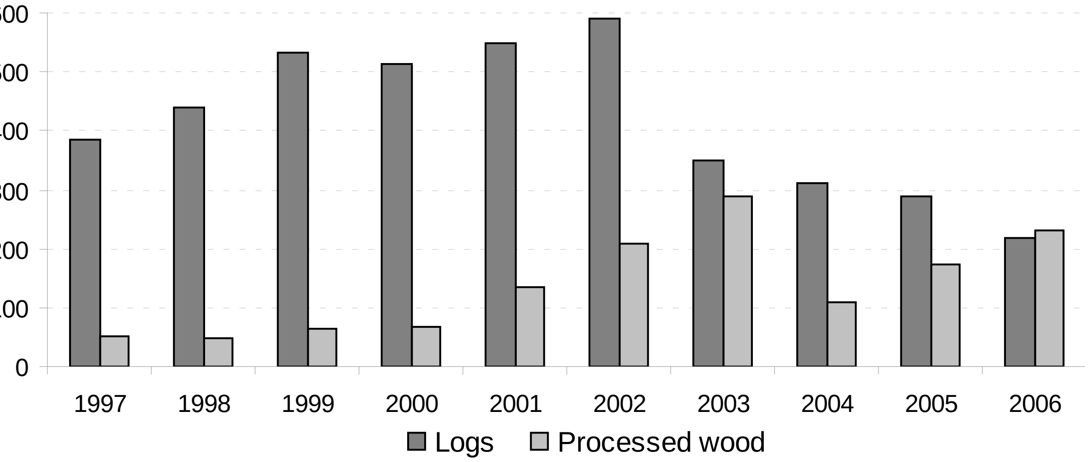
3.2 Market Requirements for Gabon's Timber Products

Two distinct export markets can be identified for Gabon's timber products – the EU, particularly France its prior colonial ruler, and China.

The EU

Gabon's timber exporting industry is a "creation" of French industry, reflecting the industrial phase in the Forest Transition trajectory in which northern firms – squeezed out of domestic sources of timber supply – indentified cheap sources of raw material supply in ex-colonies. Timber exports from Gabon to France (the major external market) started with colonial settlements during the 1850s-80s, and persisted after independence when French interests shifted towards mining activities (Wunder, 2003). Over time, total export volumes to France have risen from around 300,000 m^3 in 1989 (from when reliable records are available) to nearly 600,000 m^3 in the peak year of 2002. But, as processing capacities rose in Gabon, these log exports were complemented by exports of sawnwood, veneers and plywood, jointly reaching a roundwood equivalent of 230,000m^3, exceeding the export of logs to France in 2006 (220,000m^3) (Figure 12).

Figure 12: Gabon's Exports of Logs and Processed Wood Products to France (roundwood equivalent in 1,000 m^3)



Source: Elaborated from FAOSTAT Forestry Trade Flow data, accessed November 2009, and WRI (2000)

The EU market for timber products saw four important changes after the 1980s. First, the EU's long-term dominance of global wooden furniture exports was eroded, particularly by expanding exports from China. In 1992, Chinese furniture exports were only 14 percent of Italian and 19 percent of German exports (the two leading global furniture exporters). In 2008, Chinese furniture exports were 2.3 times those of Italy and 2.6 times those of Germany (calculated from COMTRADE, accessed December 2009). Second, as wage levels rose in the EU, so the competitiveness of its wood processing industries fell in comparison to low-income economies, who at the same time had developed their capabilities significantly in these processing sectors. This led to a migration of wood processing activities out of high-income economies as the timber furniture value chain extended. Third, governments became increasingly aware of health and safety, and regulations were instituted in many sectors to ensure higher levels of safety for consumers. Finally, the growth of per capita incomes led to greater consumer concerns with the environment and with ethical standards in value chains. In the timber sector, organizations such as the World Wildlife Fund and Friends of the Earth increasingly exerted pressure on producers to promote biodiversity and sustainability in forestry (Gulbrandsen and Humphreys, 2006; Stringer, 2006).

The growing prevalence of these standards in the EU market is reflected in Box 3 which summarizes the major trends in Europe with regard to the preferences of buyers in their purchasing of timber and the standards governing access to EU markets.

Box 3: Standards governing access to EU and other OECD markets

Three sets of standards affect the entry of timber products into high-income markets such as those in the EU.

The critical success factors of buyers
Importers acquire timber as a raw material or as an intermediate product for processing in other sectors. They trade-off a series of critical success factors, the most prominent of which for logs are price, volume, quality, species and environmental compliance. For processed wood, the dominant critical success factors are price, volume, quality, product specifications, and environmental considerations.

Industry-specific standards
Responding to concerns from civil society, two major sets of standards have emerged to protect forest ecosystems and the sustainability of forest resources. European, buyers increasingly require legality certification. In particular OLB (*Origine et Légalité des Bois*) certifies that the particular logging company is the legal owner of the concession and has the right to sell the specified logs. This includes verifying that the concession-holder has met its statutory obligations such as paying all relevant taxes. Legality certification is increasingly under the umbrella of the EU FLEGT programme (Forest Law Enforcement, Governance and Trade), whose primary main aim is to eradicate illegal timber trade.

Sustainability certification is designed to promote the sustainable use of forests. The primary standard here is the Forest Stewardship Council (FSC) scheme, which provides the systematic recording of sustainable production standards, and a chain of custody certificate tracing timber all the way through the value chain and has wide-ranging requirements including the protection of the rights of indigenous peoples. The ISO 14000 standards are also protective of the environmental impact of the timber value chain.

Public standards
Public standards are mandatory and affect health and safety concerns in the timber value chain. These technical features are, for example, covered by formaldehyde emissions arising from the adhesives used to produce plywood, chemicals used in the production of medium-density fibreboards or pollution from paint. Phytosanitary requirements ensure that "the producer has been capable of cleaning, sanitizing, sterilizing or by other means to render the offered commodity free from unwanted dirt, seeds, pests or germs" (Tissari, 2009:3). In case of sawnwoods, the cut edges are therefore treated with a special paint to prevent both infestation as well as decay. Other technical standards are building codes, and product testing requirements (Pro Forest, 2009; Sun et al, 2008).

Increasingly, where a government agency is the direct procurer of wood and wood products, EU countries have set Green Public Procurement Standards (GPP) for suppliers.

China
China is a relative wood-resource poor country with a low forest per capita density (0.13 ha relative to a world average of 0.65). Additionally, many of its forests reserves were depleted due to extensive logging beginning in the late 1950s (Démurger, et al., 2007). This has led to the Chinese government imposing logging restrictions in an attempt to stop further deforestation and environmental degradation (Bowyer, et al., 2004; White et al., 2006; Zhang and Gan, 2007). At the same time, Chinese industry was making increasing use of wood in its furniture and wood panel industries, as well as in its massive housing and infrastructure investments. Chinese government officials

reported an estimated gap of 140-150 million cubic meters in 2006 alone (Canby, et al., 2008).

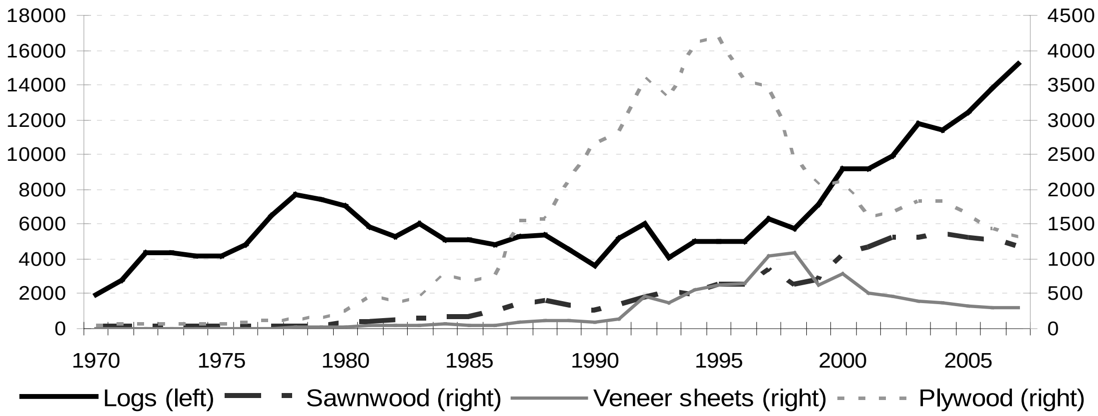
China's demand for wood has thus grown rapidly. But at the same time, its competences in wood using industries have also expanded (Table 3), so that the shortfall in supply translated into the imports of logs, as opposed to processed wood. This is evident from Figure 13 which whilst documenting a gradual increase in sawn wood imports, is most remarkable for the decline in the volume of imports of both veneer sheets and plywood, and a very rapid increase in imports of raw, unprocessed logs. China used to import plywood in the past but became a net exporter after 2001 (Adams and Ma, 2002; Changjin, et al., 2008; Kozak and Canby, 2007; White et al., 2006). However, though having developed rapidly over the past decade the Chinese wood processing industry is still not as advanced as their Northern counterparts. Consequently, whereas the North has the technology to process wood of smaller diameter and with differing wood fibre characteristics (for example, plantation wood grown in temperate climates), Chinese industries are believed to continue to demand large diameter logs from first/second growth natural forests (grown in sub-tropical and tropical climates) (Bowyer et al., 2004).

Table 3: China's Growing Share of Global Exports in Timber Processing Industries

	1992	2008
Furniture	2.7	24.7
Veneer	0.7	0.1
Plywood	0.2	0.2
Fiberboard	0.5	11.4

Source: COMTRADE, accessed 17 December 2009

Figure 13: China's Imports of Logs and Selected Wood Products (1,000 m^3)



Source: FAO ForesSTAT data, accessed November 2009

But whilst China's demand for timber products has grown, there has been little evidence of market access being governed by the sorts of standards affecting Gabon's exports of timber to the EU. Instead, given the large number of companies, low barriers to entry and exit, little product differentiation, competition in the Chinese wood processing value chain is intense often leading to an erosion of profit margins.

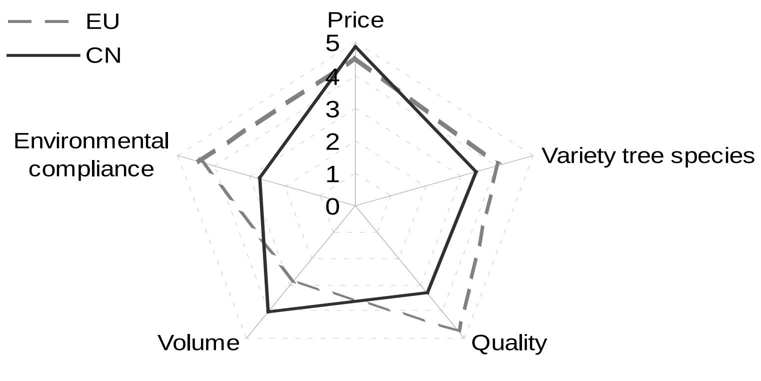
Many processing mills are thought to survive only due to state subsidies such as value-added tax rebates (Changjin et al., 2008; TFT, 2007). With the exception of some large foreign enterprises or joint ventures, wood processing companies largely follow a low-cost/low-price competitive strategy with a focus on quantity rather than quality. For example, furniture and other wood products are usually of low-to-medium quality (Castaño, 2002; Changjin et al., 2008).

There are few signs that Chinese civil society is exerting the sorts of pressures evident in northern countries where NGOs actively lobby to ensure high environmental standards in the timber value chain. There is compelling evidence that a significant (but unknown[8]) share of Chinese log imports are "illegally sourced",[9] including from Gabon (EIA, 2005; ITTO, 2005; Stark and Cheung, 2006). It is widely argued that China is at the center of illegal log trade and processing (Global Timber, 2009; Katsigris et al., 2002; White et al., 2006).[10] Insofar as the Chinese market shows any distinctive preferences for wood products, consumers appear to like dark wood characteristics, as do Indian consumers. Chinese producers favor Okoumé (a variety with which Gabon is particularly well-endowed and whose fiber characteristics make it ideal for peeling), and darker hardwoods. This contrasts with European preferences for lighter-colored woods.

EU and China Comparison

This contrast between the drivers of consumption and the determinants of market access in the EU and China surfaces in the preferences of global buyers operating in Gabon. Buyers from China tend to place a premium on low price and large volumes. They are generally less concerned with specific varieties than are the EU buyers, and also show particularly low preferences for environmental compliance and the quality of the logs, which they are purchasing (Figure 14). Specifically with respect to environmental standards, Chinese buyers make very few demands from Gabonese suppliers, particularly in comparison to EU buyers (Figure 15).

Figure 14: European and Chinese Buyers' Requirements – Wood Logs (1=not important; 5=very important)



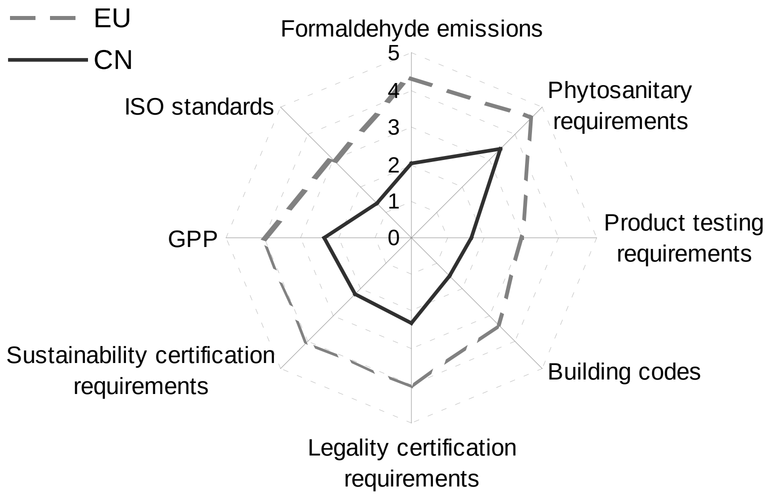
Source: Terheggen's fieldwork interviews

8 The share of illegally sourced logs of total log trade volumes is estimated to be around ten percent (EIA, 2005).

9 Illegal logging occurs when timber is harvested, transported, bought or sold in contravention of national laws (EIA, 2005; Greenpeace, 2009)

10 "China's sources for hardwood log imports reads like a who's who of countries with problems with illegal logging" (EIA, 2005:3)

Figure 15: EU and Chinese Buyers' Requirements –International Regulations and Standards (1=not important; 5=very important)*



Source: Terheggen's fieldwork interviews
Note: * See Box 3 for details of standards

3.3 Changes in Market Destination of Gabon's Timber Exports

From Gabon's perspective, the evolution of the EU and the Chinese markets has had major consequences for the direction and nature of its timber exports. Beginning with the direction of exports, China (and India) have now become the dominant global importers of tropical hardwoods as EU economies have moved to the imports of processed woods and have become increasingly concerned about the sustainability of global hardwood reserves. Between 1990 and 2007, China's share of global imports rose from 14 percent to 68 percent (and India from five percent to 17 percent), whilst the share of all OECD economies collapsed from 78 to 11 percent (Table 4). With 1990 as the base-year, in 2007 China's imports of tropical hardwood had more than quadrupled in volume terms; in the same period, EU and wider OECD imports had fallen by more than 90 percent.

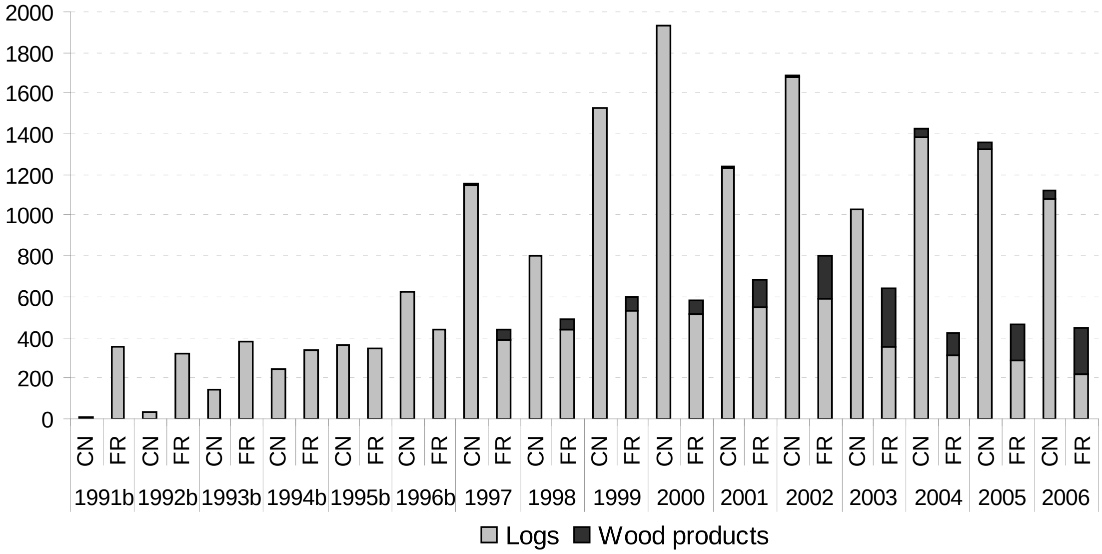
Table 4: Share of Global Tropical Log Importers for Selected Countries

1990		1997		2007	
Japan	39.5%	Japan	32.3%	**China**	**68.2%**
Korea, Rep.	16.1%	**China**	**29.2%**	India	17.2%
China	**13.9%**	Korea, Rep.	6.5%	Japan	3.8%
Thailand	8.1%	India	5.5%	France	2.1%
India	4.7%	Thailand	4.5%	Thailand	1.3%
France	3.6%	France	3.7%	Spain	0.9%
Italy	2.9%	Philippines	3.7%	Korea, Rep.	0.8%
Portugal	2.1%	Norway	2.2%	Italy	0.8%
Spain	2.0%	Pakistan	1.9%	Turkey	0.7%
Germany	1.4%	Portugal	1.8%	Portugal	0.6%
OECD	**78.29%**	**OECD**	**53.23%**	**OECD**	**10.99%**

Source: FAOSTAT ForestSTAT data, accessed November 2009.

This is reflected in the destination of Gabon's timber exports. China became a significant importer of Gabon's timber in the mid-1990s (Figure 16). In volume, Chinese imports of the roundwood equivalent of sawnwood, veneers and plywood is currently more than three times those of French imports, but in value, China imports roughly the same value of timber products from Gabon. The difference between value and volume shares is accounted for by the fact that, as will be shown below, the Chinese market is almost exclusively a market for unprocessed logs, whereas an increasing (albeit still small) share of the EU market is serviced by processed timber products which has a higher unit value. Despite being the dominant importer of Gabon's timber by volume, China's dominance in Gabon's timber trade is a little atypical of the global picture where its share of imports is even higher. The high relative share of France in Gabon's exports reflects its close historical links with France and the long presence of French timber companies operating in Gabon.

Figure 16: Chinese and French Tropical Wood Product Import Structures from Gabon – Log and Wood Product Volumes (in 1,000 m^3 RWE)*



Source: FAOSTAT Forestry Trade Flow Data, accessed October 2009

* The calculation of the roundwood equivalent uses the following conversion factors, based on the responses of firms in Gabon. For EU: the sawnwood ratio is 2.5:1, for, veneer sheets 1.82:1, and for plywood 2.3:1. For China: the sawnwood ratio is 2.05:1 (reflecting lower quality requirements of buyers). Veneer sheets and plywood have the same conversion factor as in exports to the EU.

3.4 Consequences

What have been the consequences for Gabon of the shift in the market for its timber exports, and what are the implications for the trajectory of its timber industry? Two major developments can be noted - the nature and extent of standards imposed on producers, and the accretion of value added to harvested logs

<u>Standards</u>

Bluntly-speaking, the transition in market destination has led to a collapse in the standards required of producers (Figure 17). These standards have important implications for capability-building. Greater demands for quality require enhanced skills and the capacity to improve quality over time. Instead, Gabonese timber suppliers can basically sell any timber product to China, irrespective of the quality of cutting, sawing or finishing, as long as the price is low and volumes are large. Environmental standards which influence health and safety in the treatment of forest products are an important safeguard for the welfare of the workforce. Certification of logs helps to ensure that the sustainability of the forests are maintained, and environmental certification such as FSC accreditation helps to maintain biodiversity and to promote social cohesion. Virtually none of these standards apply to products exported to China; virtually all apply to products exported to the EU.

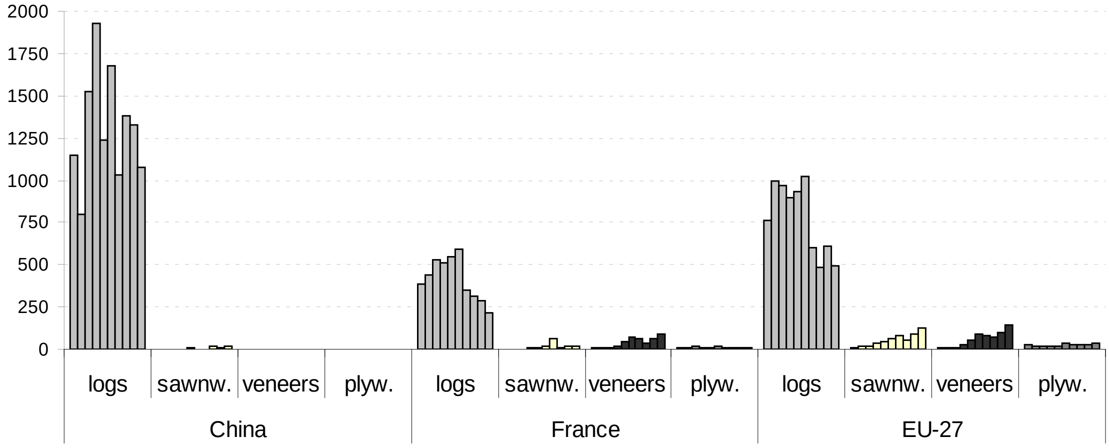
Figure 17: Summary of Preferences and Buyer Standards of Chinese and EU Buyers of Gabon Timber Products

	Chinese buyers	**EU buyers**
Critical Success Factors in Purchasing Decision		
Stage of processing	logs	logs and processed wood
Species variety	wide range, limited selection	narrow range, selective
Quality	medium	High
Volume	large	Small
Product specifications (e.g. cut specificity)	moderate importance	important, intricate
Price	critical	critical
Environmental compliance	minor importance	important
Industry-Specific and Public Standards		
Formaldehyde emissions	not important	important
Phytosanitary certificate	basic entrance criteria	important
Building codes	not important	moderate importance
Product testing requirements	not important	moderate importance
Labor standards	not important	moderate importance; few applications
Legality certification	not required	important, OLB dominates
Sustainability certification	not required	important, FSC dominates
green public purchasing	minor importance	important; few applications
ISO 14001	not required	moderate importance

<u>Value added</u>

A combination of factors, particularly the growth of its own wood processing industries have led to China almost exclusively importing raw logs, In addition, China's low wages and lax environmental regulations mean that it is a direct competitor to Gabon's processing industry in a way which is not true for the EU where high wages make for uncompetitive processing in labor intensive industries which are often also polluting. Whilst the bulk of Gabon's timber is still exported as raw logs, in recent years Gabonese producers have begun to export an increasing volume of sawnwood, veneers and plywood. This can be seen from Figure 18 (which underestimates the value of this shift in export composition, since it reflects export volumes rather than export value, - the unit price of processed wood is higher than that of unprocessed logs) where it is evident that China shows little inclination to import either veneers or plywood.

Figure 18: Log and Wood Product Demand Distribution for China, France, and the EU-27 countries 1997-2006 (volume in 1,000 m^3)



Source: Calculated from FAOSTAT Forest Trade Flows data, accessed November 2009

<u>The development impact: factor utilization</u>

Since one of the major consequences of a shift in the final market from the EU to China is that the degree of processing falls, what are the consequences of this for factor utilization in the Gabonese economy? Table 5 simulates factor utilization if the same quantity of wood is exported in the form of logs, sawnwood, veneer sheets and plywood. It calculates the resultant earnings of foreign exchange, and the derived utilization of labor and capital, taking into account processing loss in the conversion of logs, as well as the unit-prices in global markets in 2006. It is necessarily a crude exercise, but nevertheless, the exercise does throw some light on the developmental consequences of alternative uses of forest resources, as reflected in different destinations of final markets.

It is evident from this that there is a substantial gain in employment to be achieved by the downstream processing of logs into sawnwood, veneer and plywood. Employment is more than doubled if the logs are converted into sawnwood, trebled with the extension to producing veneer sheets, and quadrupled if these veneer sheets are then incorporated in the production of plywood. Foreign exchange earnings are also enhanced with further processing, by 25 percent in the case of veneer and 12 percent in the case of plywood. However, this is not the case with regard to sawnwood. Here there is a value and foreign exchange loss in processing since the Gabon sawmill industry is inefficient and has low conversion rates. Veneer firms also lose money in processing. The reason why firms invested in sawmilling and veneer production is purely a function of the Forestry Code where firms, who were unable to afford the high capital entry costs into the production of plywood and/or veneer, deepened value-added in the expectation of meeting the 2012 Forestry Code target. These loss-making firms manage to stay in production, due to the profits earned through their log exports (Table 5). This augmentation of value, employment, and foreign exchange earnings through processing come at a very considerable cost of capital, particularly in the production of plywood and veneer, and comprises a major obstacle for local firms in meeting the Forestry Code's 2012 target.

Table 5: Gabon Log Output Channeled into a Single Chain (at Gabon Wood Utilization Rates), Assuming Input of 3,400,000m³ logs[a]

	Logs	**Sawn wood**	**Veneer sheets**	**Plywood**
Output real ('000m³)[b]	3,400	1,380	1,870	1,480
Foreign exchange[c]	1,188	758	1,480	1,329
Employment (incl. employment in earlier stages of processing)[d]	6,299	16,967	19,389	34,951
Capital cost *($1,000)* [e]	39,500	43,800	455,000	754,000
Producer margins (fob value minus cost) (indexed to ex-forest cost of log)	107	-28	-23	23

Source: Terheggen's fieldwork data and, and Odyseé Développement (not published)

Notes: [a] Gabon log production volume rounded average for 2003-2007

[b] Converted using wood utilization rates in meeting EU buyer requirements regarding species and product specifications, i.e. 2.5:1 (EU sawnwood), 1.82:1 (veneer sheets) and 2.33:1 (plywood)

[3] Species weighted average using 2006 prices based on (UNCTAD) (Okoumé logs, sawnwood, and plywood), (ITTO, 2009) (average hardwood log prices Central African species, own calculations), and (FAOSTAT) (veneer sheets export unit price, own calculations)

[4] Own calculations based on fieldwork data collected November 2008–March 2009

[5] Terheggen's calculation based on 2003 capital depreciation costs across chains as stated in (Odyssée Développement, 2005) converted into US$ using average 2003 exchange rate (http://data.un.org); excluding environmental costs such as consultancy and certification fees.

Equally concerning from a developmental perspective is the competitiveness of Gabonese producers at various points in the timber value chain. It is clear that Gabon possesses a significant resource rent in tropical hardwoods in general and Okoumé in particular. Table 5 shows that the fob price of a log is approximately double that of the cost of extraction, however, at current prices, and with current levels of processing efficiency the surplus generated in plywood manufacture is much smaller, both as an absolute sum and as a proportion of costs. And at current prices, all of the resource rents are dissipated – indeed more than dissipated – if logs are sawn or transformed and exported as veneer. Thus, the "retrograde" transition from processed to raw timber reflected in the shift from the European to the Chinese market may arguably be developmentally positive, at least in terms of static comparative advantage and at current prices.

But neither of these two conditions are a "given". With appropriate policy support and in competitive markets, it is possible that processing efficiency in Gabon's timber value adding sectors (especially in sawmills) could be improved. Moreover, it is also possible that Chinese producers will increasingly have to internalize some of the environmental costs which are currently not reflected in timber prices and the prices of processed wood products. This may lead to an increase in the relative price of sawnwood, veneer and timber which will enable Gabonese producers to appropriate a larger portion of its timber rents in the processing stages of the timber and wood products value chain.

4. CONCLUSIONS

We began this paper by observing that the growth agenda in many low-income countries has focused disproportionately on the development of supply capabilities, rather than on the role played by demand in general, and by the nature of demand in particular. The focus of our analysis has been on the extent to which demand from low-income economies feeds through into the organization of GVCs in two particular respects – the importance of process and product standards, and the extent to which low-income exporting economies are constrained in their capacity to deepen value added in their chains. The context is one of a global economy where China and India – both low-income economies – are likely to be the major drivers of global demand, particularly in soft commodity sectors (producing foods such as cassava, and intermediate products such as timber) and in hard commodity sectors which produce the inputs required for the massive investments in infrastructure and housing as the giant Asian Driver Chinese and Indian economies urbanize rapidly (Kaplinsky and Farooki, 2010).

We explored two hypotheses on the likely outcome for southern economies as the demand driver switches from the north to the south by focusing on the cassava value chain in Thailand (Section 2) and the timber value chain in Gabon (Section 3). In both of these cases, Chinese demand is becoming increasingly dominant, reflecting the very rapid growth of a very large low-income economy. In the cassava sector, Chinese demand for food and energy has led to a derived demand for cassava, substituting for a rapidly declining EU market. In Gabon's case, northern demand for tropical logs has collapsed, whilst Chinese demand has mushroomed. In the case of timber the associated shift from differentiated to undifferentiated product demand is particularly clearly evidenced. Northern importers are focused on a narrow range of species, and buyers are much more demanding on log specifications, variety and quality than are Chinese buyers (who basically want large volumes at a low price).

With regard to the derived implications of this market shift for standards, it is clear that in both cases value chains feeding into a southern market are much less likely to be standards-intensive than those feeding into northern markets. This is very clearly evidenced in the timber sector, both in relation to government-imposed standards focusing on health and safety and for civil-society induced standards focusing on the environment. Cassava production is less standards-intensive but here, too, there is clear evidence that the move from a northern to a southern market leads to a significant reduction in the standards-intensity of value chains.

With regard to the move from a win-win north-south division of labor to a win-lose south-south division of labor, we observed similar trends in both Thailand's cassava value chain and Gabon's timber value chain. The change in final market from the EU to China effectively wiped out a key value added link in the Thai cassava value chain as Chinese demand for raw chips substituted for EU demand for processed pellets. On the other hand, China also increased its demand for starch imports from Thailand, starch having a higher level of value added than either cassava chips or pellets. However, within starch, Chinese firms are seeking to command the higher value added and more technologically demanding niches, relegating Thai firms to the production of simple native starches. A similar story can be told for Gabon, where the Chinese market only demands unprocessed logs, whereas exports to the EU have increasingly comprised logs processed into sawnwood, veneers and plywood. This clearly evidences the competitive nature of industrial trajectories in southern trading economies which are more likely to have win-lose outcomes in specialization than in the case of win-win trade with northern economies.

So what are the wider implications of these findings? First, the growth implications are mixed and somewhat analogous to those associated with declining barter terms of trade. That is, the unit value added/price of commodity exports to China may fall, but augmented demand may increase total export incomes. Similarly, the challenge facing commodity exporters forced down the value added chain as Chinese demand grows is similar to that faced by developing country exporters in general who specialized in static dynamic comparative advantage. In this case, incomes may grow, but at the cost of falling capabilities. Chinese demand appears to force both the Thai cassava and the Gabon timber sector into low-technology, low-skill niches in their chains. This is reinforced by the lower requirement for standards in these value chains. Although standards also have their negative side – see below – they are promoting of managerial and skill competences in production. Another positive consequence of standards in production is that they most often reflect the need to compensate for non-price externalities arising in production (for example, the loss of biodiversity) rather than just embodying ethical concerns (for example, in relation to minimum wages or child labor).

A further negative consequence of trade with China, India and other southern economies is that insofar as it involves lower degrees of value added, there will be a loss in employment and, in some cases, in investment surpluses.

On the other hand, the substitution of a southern for a northern driver of demand has many advantages for low-income countries and for participants in their value chains. Particularly in the context of sustained economic crisis in the north, it provides a dynamic and particularly rapid source of demand, allowing exporting economies and firms to reap scale economies and to reduce their costs. And, insofar as their previous trajectory may have been costly (as is arguably the case in Gabon's timber industry where industrial ambitions may be forcing the country to waste its resource rents in inefficient processing), being driven back into comparative advantage through trade with China and other southern economies may provide unintended benefits. Further, it is not axiomatic that all standards are developmentally beneficial in the context of low per capita incomes. The trade-offs in terms of lost employment and value added may be too high, for example, to justify the higher safety standards driving much legislation in the north or indeed to meet the ethical concerns of northern civil society. Finally, there will be complex and differentiated implications for different participants in southern value chains. For example, small firms and farmers who are currently largely excluded from participating in global value chains by the need to encompass high standards in their production for northern markets may now find that these barriers to entry are removed.

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