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# INVESTIGATING THE STRUCTURES OF AGRICULTURAL TRADE INDUSTRY IN DEVELOPING COUNTRIES

*by*

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# EXECUTIVE SUMMARY

## Statement of the problem

Under the ideal of inclusive growth, benefits from expanding international trade in agricultural products are spread widely and equitably over the global value chain. Critics of globalization however posit the contrary: that most of the benefits are captured by a few firms that dominate key nodes, to the exclusion of smallholders and small enterprises, whilst undermining food affordability at the retail level.

However, detailed information about the organization of agro-industry firms with strong developing country presence and engaged in international trade is scarce. Understanding how trading firms have been organized based on empirically verifiable facts and causal factors is important for analyzing the distribution of trade benefits among firms and among their upstream or downstream links.

## Characterizing global agro-industry trade

Agriculture together with agribusiness combine to account for a prominent share of output in developing economies. As income increases, the size of agribusiness rises relative to that of primary agriculture. Over time, international trade in agricultural products has been increasing, even during the period of declining real commodity prices (1980s – 1990s). During this period the structure of commodity trade had been shifting from traditional products to newer products such as horticulture and seafood.

Global exports are dominated by the developed countries. Among the developing countries the top exporters are in Latin America and East (including Southeast) Asia. The agro-food industry exhibits high levels of concentration and has undergone increasing consolidation in recent decades.

The stages of economic activity, encompassing production, processing, marketing, and retail, have been traditionally organized under smallholder or small enterprise systems with low capital intensity and low levels of technology. In contrast is the modern sector with greater capital intensity, level of technology, and scale of operations, and this sector has been growing over time. Based on review of past studies, it appears *the dominance of large-scale operations is more pronounced in the downstream stages, compared to primary stages*. Moreover, *distribution for foreign markets is the most concentrated part of the global value chain.* This is seen for developing countries which are globally important producers of selected commodities (e.g. market structure and therefore export trade is highly concentrated). Likewise global logistics and trade in widely traded commodities (grains, vegetable oils) is dominated by a few distribution companies, handling both export and import sides of the business. The limiting case of monopoly can be observed where government edict reserves export or import trade to parastatals.

## Explaining agro-industry trade

Horizontal concentration arises from economies of scale together with entry barriers. These factors are becoming more important worldwide, including in developing countries, owing to several global drivers, as follows: S*upply drivers* involve technological change such as information technology, inventory and logistical systems, production and processing technologies, and biotechnology. *Demand drivers* involve rising affluence in urban populations, with consumer preferences oriented towards food safety, high quality, and differentiated products, which tends to favour sophisticated production and distribution systems. *Policy changes* which in recent decades has taken the form of liberalization of trade, marketing, and foreign investments (despite persistence of controls for selected and sectors and countries). These have opened up entry to the private sector, including foreign investors. In one sense this has reduced concentration (as the monopoly parastatal has been eliminated), though the ensuing oligopoly may still exhibit a high degree of agribusiness consolidation.

This leads to the last driver, *institutional change*, namely the transition from spot markets to the formation of supply chains characterized by vertical coordination, outsourcing, and contracting, and quality standards, at both domestic and global level. At one extreme is vertical integration, though other forms of coordination are practiced, e.g. contract growing. For modern retailers, imposition of quality standards and delivery requirements compel adoption of modern practices over the span of the chain.

## Implications

Market concentration has raised concerns about equity of benefits from trade; based on one popular indicator (share in retail price of producer price), the benefits of trade have apparently skewed against developing country producers of primary or semi-processed products. If such skewness is attributable to market power, there may indeed be scope for policy intervention. The review finds the following:

There is some evidence for *significant market power being exercised in among the more concentrated value chains*. Furthermore indications that *market concentration can also be leveraged to widen the exercise of market power via coordination along a supply chain*. However, the association is not absolute; there are *counter-examples in which highly concentrated industries seem to operate in a competitive environment* with only moderate to low degree of market power. Furthermore, *concentration and coordination tend to be associated with improved technologies and innovation*, though again the evidence is mixed.

At the farm level the evidence is more solid: *size of land asset or scale of production, by itself, does not seem to disqualify smallholders from supplying to consolidated value chains*, as there are enabling schemes such as supervised contract growing, cooperatives, farmer associations and the like. *More critical however are human capital, farm management practices, and other assets such as equipment and irrigation facilities*.

Despite the great volume of relevant literature, the tentative nature of the findings stated above indicate wide scope for further research in this area. Better and more solid information and analysis could perhaps pave way towards design of policies towards more equitable and yet productive and efficient global value chains.

# 1. INTRODUCTION

The globalization of agricultural and food trade has been hailed as a "big opportunity" for farmers and agribusiness entrepreneurs. However, considerations of quality, timeliness, and economies of scale have posed special challenges to smallholders (World Bank, 2008). The UN Special Rapporteur on the Right to Food (2009) sounds the oft-repeated alarm that "concentration in food production and distribution chains has been significantly increasing over the past years. The resulting market structure gives buyers considerable bargaining strength over their suppliers, with potentially severe implications for the welfare both of producers and consumers (p. 5)." Benefits from growing international trade in agricultural products are believed to have been captured by a few firms that dominate key nodes of the global value chain, to the exclusion of small farmers and producers at the primary level, whilst undermining food affordability at the retail level.

However, detailed information about the organization of agro-industry firms engaged in international trade is scarce. Understanding how trading firms have been organized based on empirically verifiable facts and causal factors is important for analyzing the distribution of trade benefits among firms and among their upstream or downstream links. This study, part of a wider analysis on the determination of the distribution of agricultural trade benefits among firms and stakeholders in developing countries, seeks to compile and synthesize related literature on the structure of agricultural trade industry in developing countries.[2] The objectives are:

1) To review the theory and evidence on the structure of agricultural trade industry in developing countries;

2) Based on a literature survey, to determine what causes the industry structure and how it affects the distribution of trade benefits among firms.

Regarding objective 1, the hypothesis is that trade in agricultural products is dominated by a small number of large firms receiving most of the trade gains. Under this objective, the study would attempt to describe a typology of organization/structure of agricultural trade industry, and characterize the actual organization of agricultural trade industry in developing countries (focusing on the main commodities) based on the typology.

Regarding objective 2, the study seeks to understand the factors behind the formation of the observed industry structures in agricultural trade, such as regulatory barriers, access to markets (i.e. raw materials), limit pricing, and so on. It would also draw implications for the distribution of trade benefits.

This review finds a burgeoning literature on agribusiness concentration and openness of the value chain to small farmers in developing countries. A distinct treatment for *internationally traded* food products is less prominent, except for the preoccupation with the *global* value or supply chain. Large agribusiness companies have penetrated global markets mostly by foreign direct investment. The data would indicate the share of a few high-profile companies in global sales of particular products, but "global sales" are certainly different from volumes and values of cross-border trade.

[2] Here "trade" denotes cross-border exchange of goods that can be adequately documented; informal trade across porous borders is, for lack of data, excluded.

Unfortunately there are very few systematic studies on the shares of agribusiness firms, particularly large ones, in international trade; market concentration would have to be inferred from "partial evidence" (Dy, 2009). The insights and findings from the literature on agribusiness structure are therefore relevant to agricultural trade. Hence the broader literature on agribusiness structure is still covered in our literature survey.

The rest of the paper is organized as follows: Section 2 provides a setting and context by presenting patterns and trends in agricultural trade and agribusiness. Section 3 addresses Objective 1 by describing a typology of agribusiness organization and tracing the structure and evolution of agricultural industry in terms of this typology, which provides insight into the structure of agricultural trade (exporters and importers of agricultural products) in developing countries. Section 4 addresses Objective 2 and analyzes causes and distributional effects of agricultural industry structure. It provides a schema for categorizing the causes and outcomes of industry structure and reviews available evidence of the hypothesized interactions. Section 5 concludes.

## 2. AGRICULTURE, AGRIBUSINESS, AND TRADE

*Agriculture together with agribusiness combine to account for a prominent share of output in developing economies. As income increases the size of agribusiness rises relative to that of primary agriculture.*

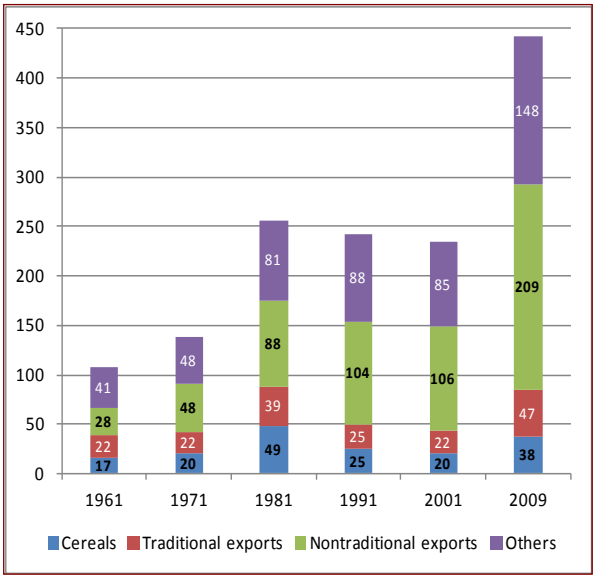
In the developing world, it is well-known that agriculture remains a sizable part of the economy; less publicized is the fact that agribusiness is also significant, perhaps more so as a share in GDP. While most farms (up to 85 percent ) fall in the smallholder category of below 2 ha (von Braun and Diaz-Bonilla, 2008), large swathes of agribusiness can be controlled by just a handful of firms. Following Wilkinson and Rocha (2009), "agribusiness" refers to agriculture-related activities that provide inputs to farmers, and connects them to consumers through the handling, processing, transportation, marketing, and distribution of agricultural products. Their data suggest that in agriculture-based, low-income countries,

Table 1. Share of agriculture and agribusiness in GDP, selected developing countries, recent years (%)

| | Agriculture | Agribusiness |
|---|---|---|
| Cameroon | 40 | 17 |
| Cote de Ivoire | 28 | 26 |
| Ethiopia | 56 | 30 |
| Ghana | 44 | 19 |
| Kenya | 26 | 23 |
| Nigeria | 42 | 16 |
| Indonesia | 20 | 33 |
| Thailand | 11 | 43 |
| Philippines | 12 | 15 |
| Agri-based countries | 39 | 22 |

Source: Wilkinson and Rocha (2009); Philippines - from Balisacan et al (2011)

Figure 1. World agricultural exports, 1961-2009, in constant $ (1984 = 100)




Note: Traditional exports denote coffee, cocoa, tea, spices, natural rubber, sugar, and sugar products; nontraditional exports denote fruits and vegetables, meat and meat products, and feedstuff.

Source: Trade data from FAOStat; US CPI from http://data.bls.gov

the ratio of agriculture to agribusiness is around 0.6 (Table 1). The ratio increases to somewhere below 2 for "transforming" countries, and around 3 for urbanized developing countries (in a developed country such as the US the ratio is about 13).

*Trade in agricultural products has been increasing, even over the period of declining real commodity prices (1980s – 1990s). During this period the structure of commodity trade had been shifting from traditional products to newer products such as horticulture and seafood.*

Global exports of agricultural products has been increasing since the 1960s (Figure 1). Since the 1960s, growth of exports (in real terms) has averaged about 3.6 percent. In the 1980s to 1990s, world commodity prices had been on a long term relative decline (FAO, 2004), explaining in part the fall in world agricultural exports over the sub-period.

Furthermore, the share of nontraditional exports has been rising sharply, whereas that of cereals and traditional exports had been declining, at least until 2001 (Figure 1). This is consistent with the changing structure of trade noted by Humphrey and Memedovic (2006), characterized by a shift away from traditional tropical products (coffee, cocoa, tea, sugar, spices and nuts) and towards products such as horticulture and seafood.

However a commodity price boom in the late 2000s reversed the long term price decline. A more extended time series of food and other agricultural exports is shown in Table 2. Trade in food products continues to grow, albeit at a slower pace than overall merchandise trade. The major food items are listed in the table; among these, the traditional products such as cereals, coffee, tea, cocoa and spices, and sugar experience low to negative growth (adjusted for inflation); similarly for traditional non-food items such as crude rubber, cotton, and feeds. However these traditional items (except cotton) underwent a resurgence in the late 2000s, ending up with comparable growth rates as the emerging commodities such as meat, fish, vegetables and fruits, beverages, and oilseeds.

*Global exports are dominated by the developed countries. Among the developing countries the top exporters are in Latin America and East (including Southeast) Asia.*

While developed countries are seen to have achieved an "industrialized" status, they also dominate world agricultural exports. This is no coincidence, as industrialization leads to sophisticated agro-industries and ancillary services. The top exporters are the US and big producers in the EU, namely France, Germany, and the Benelux countries of the Netherlands and Belgium (Figure 2). Among the developed countries the top exporters are the Latin American countries with the largest land areas (Brazil and Argentina), China, and a few countries from Southeast Asia. Among the developing countries, the top exporters tend to fall in the middle to high income bracket. Diaz-Bonilla and Reca (2000) note that developing countries are traditionally net exporters of oilseeds and products, coffee and cocoa, sugar,

Table 2. World merchandise exports, total and selected item, 1995 – 2010

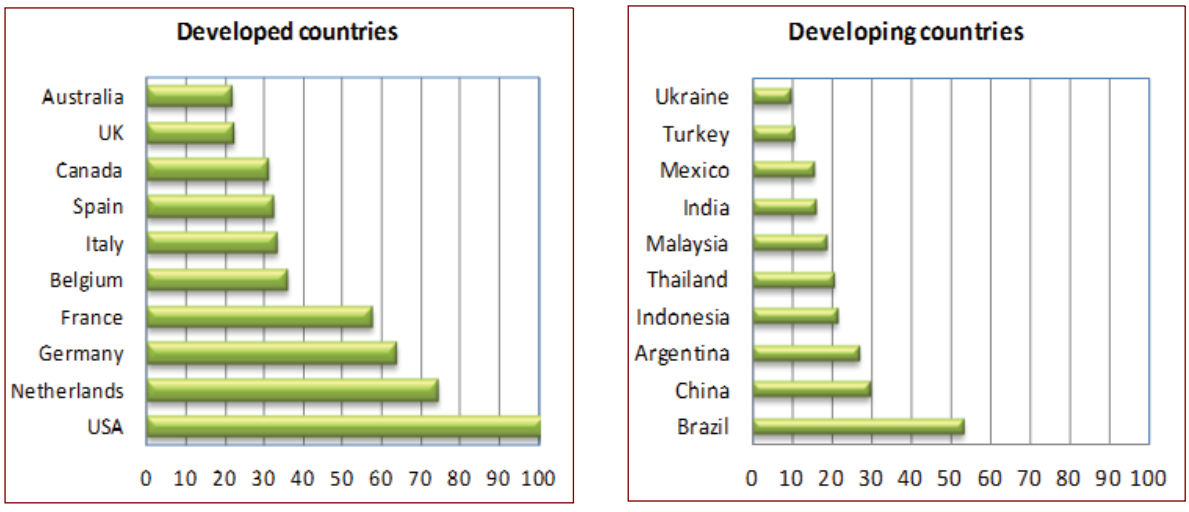
| | Exports, in $ billions | | | | Average growth, real terms (%) | |
|---|---|---|---|---|---|---|
| | 1995 | 2000 | 2005 | 2010 | 1995-2005 | 1995-2010 |
| Total all products | 5,121 | 6,368 | 10,457 | 15,148 | 5.5 | 5.5 |
| Food (including preparations) | 460 | 426 | 681 | 1,143 | 1.7 | 4.1 |
| Meat | 48 | 45 | 75 | 119 | 2.2 | 4.1 |
| Fish, crustaceans, molluscs | 48 | 51 | 73 | 109 | 1.9 | 3.4 |
| Cereals | 56 | 50 | 73 | 129 | 0.1 | 3.5 |
| Vegetables and fruits | 71 | 70 | 117 | 184 | 2.9 | 4.4 |
| Sugar, sugar preparations | 21 | 15 | 24 | 48 | (1.0) | 3.6 |
| Coffee, tea, cocoa, spices | 33 | 28 | 45 | 86 | 0.6 | 4.5 |
| Oil seeds and fruits | 13 | 14 | 23 | 56 | 3.7 | 8.4 |
| Miscellaneous | 19 | 19 | 36 | 57 | 4.3 | 5.4 |
| Beverages | 33 | 34 | 58 | 80 | 3.7 | 4.0 |
| Crude rubber | 14 | 10 | 22 | 46 | 2.5 | 6.4 |
| Cotton | 12 | 8 | 11 | 19 | (3.6) | 0.7 |
| Animal and vegetable oils | 27 | 19 | 39 | 83 | 1.2 | 5.7 |
| Feedstuff for animals | 21 | 20 | 31 | 61 | 1.8 | 5.5 |
| Tobacco | 25 | 22 | 26 | 36 | (2.3) | 0.0 |

Note: Growth rates have been adjusted for annual inflation of the US CPI.
Source: Trade data from UNCTADStat; CPI data from http://data.bls.gov

and fruits and vegetables. Industrialized countries dominate world exports in processed and high value food products except oilseed products. Developing countries are net importers of dairy products and cereals, except for rice.

*The agro-food industry exhibits high levels of concentration and has undergone increasing consolidation in recent decades.*

Figure 2. Top ten agricultural exporters , by country category, 2009 ($ billions)




Source of basic data: FAOStat.

Table 3. Concentration ratios in selected food industries in the US (%)

| | Past (year) | Present (2006) |
|---|---|---|
| Beef packing | 72 (1990) | 83.5 |
| Pork packing | 37 (1987) | 66.0 |
| Broiler | 35 (1986) | 58.5 |
| Turkey | 31 (1988) | 55.0 |
| Soybean crushing | 54 (1971) | 80.0 |
| Food retailing (CR5) | 24 (1997) | 48.0 |

Note: Ratios pertain to CR4, except where otherwise indicated.

Market structure issues for global agro industry are discussed in the next section; in this section the focus is on domestic markets. High levels of concentration and accelerated consolidation is established at least for some OECD countries. The Hefernan report (Hendrickson and Hefernan, 2006) presents concentration ratios for US food industry as of 2005 (Table 3).

The highest four-firm concentration ratio (CR4) is in beef packing and soybean crushing, at 80 percent or more, while the CR5 ratio in food retailing is lowest at 48 percent. The concentration ratios are all higher than in a previous year (1990 or earlier). Sexton et al (2007) find that, at the four-digit SITC level, CR4 in US food manufacturing was about 76 percent in 1997; cigarette manufacturing is the most concentrated at 98 percent. In general, average seller concentration in the EU is higher than in the US, averaging a CR3 of 67 percent for nine countries.

Reardon and Timmer (2005) demonstrate that a similar agribusiness consolidation process is now occurring in many developing countries. They distinguish between commodity and product (in rather idiosyncratic sense) as follows: the former refers to standardized agricultural products with minimal processing and differentiation; the latter refers to subsets of a commodity that are differentiated in terms of brand, degree of processing, or other attributes (e.g. organic). Agribusiness consolidation can be seen as part of the transformation of agrifood systems from commodity to products over the past half-century.

The early, traditional stage was characterized by the following:

- Numerous small producers;
- Direct sale through traditional wholesalers to the urban market, or direct sale to retailers of local brokers for the rural market;
- Informal vendors, small shops, wet markets as the retail segment of the output market.

Traditional systems would eventually shift towards a product-oriented food market where agents are typically larger and more capital intensive. Downstream consolidation leads to the rapid ascendance of large processors, supermarkets, and food service chains, coexisting with traditional brokers, wholesalers, and smallholders. Consolidation entails diffusion of new organizations, institutions, and technologies; the pace of evolution varies across regions, with urban areas in middle income developing countries transforming earliest.

Table 4. Schema for characterizing the structure of global agro-industry

| Activity | Engagement in the international market | Vertical coordination | Horizontal structure |
|---|---|---|---|
| Input supply | Cross-border trade | Integration | Monopoly |
| Production | Foreign investment | | |
| Processing | | Spot market | Oligopoly |
| Distribution | | | Monopolistic competition |
| Retailing | | | Atomistic competition |
| | | | *Participation threshold* |

Source: Authors' diagram

# 3. AGRO-INDUSTRY TRADE STRUCTURE: GLOBAL PERSPECTIVE

## The structure of global agro-industry: a schema

Table 4 presents a schema by which to characterize the structure of global agro-industry and trade. Economic activities related to agriculture range from production to consumption and may be simplified in terms of the stages, as in the leftmost column. Inputs to farm production include seeds, fertilizers, chemicals, services (e.g. credit, irrigation, animal health), and so on. Upon harvest the output undergoes processing, after which it is distributed to retailers, finally reaching the end-consumers. Processing spans from basic (e.g. rice milling) to intensive (e.g. breakfast cereal); distribution covers wholesaling, international marketing (whether import or export side), and logistics. Retail includes supermarkets, restaurants, shops, and wet market stalls. Note however that the marketing is by no means limited to the last two stages as it can occur at each transition (e.g. dealers sell fertilizer to farmers, etc.)

Each of these stages can be elaborated along three dimensions of international industrial organization, namely: i) engagement with the international market; ii) vertical coordination ; and iv) horizontal market structure.

*Engagement in the international market* – a firm may opt to limit its activity and transactions to its domestic market, or engage other players in the international market. The most common mode of engagement is through cross-border trade in goods; however foreign direct investment has emerged as another important modality.

*Degree of vertical coordination* - The sequence of activities in the leftmost column of Table 4 comprise a "value chain". In its traditional form, exchanges along the chain are arranged through arms-length transactions within a spot (cash) market. The study of modern supply chains and value chains emerged as a separate literature to study cases in which actors introduce coordination over some links in the chain. The tightest coordination is enforced through ownership under vertical integration. Between vertical integration and the spot market are other coordination mechanisms, e.g. contract growing.

*Horizontal market structure* – as with degree of vertical coordination, the degree of market competition is a spectrum spanning from pure competition by atomistic firms to a literal monopoly or monopsony. An oligopoly (oligopsony) exists when there are few sellers (buyers); strictly speaking "few" is defined not by a numerical cut-off, but by the recognition of other firms as *rivals* in terms of price setting, market share, or both.

Another form of competition between that of atomistic competition and oligopoly is monopolistic competition, which emphasizes product differentiation. While product differentiation may also be applied to firms in an oligopoly or even monopoly, firms under monopolistic competition may not necessarily regard themselves as industry movers. Nevertheless within the market niche opened up by their differentiated product, they are able to exercise some degree of market power.

The schema introduces an additional aspect of horizontal market structure, which is the *participation threshold*. The participation threshold refers to the minimum economic scale required to enter and remain in the market. Such scale is required to pay back a large initial outlay (see Section V discussion on sunk cost). The idea of participation to the level of microenterprises and small farmers occupies much of the recent value chain literature. In contrast, the notion of minimum economic scale and barriers to entry is well recognized in the I-O literature, but is sporadically investigated in the theory and empirics of market structure. The I-O literature has focused rather on the origin and extent of market power in relation to various forms of market concentration.[3]

## Input supply

The 25 top global suppliers of inputs (except feeds) listed in UNCTAD (2009) are all based in developed countries, with eight based in the United States. The top ten are shown in Table 5. The top five have assets of approximately $ ten billion or more; foreign sales account for the bulk of sales (except for one US-based company). Many are large business conglomerates with diversified interests in manufactures, e.g. BASF, Dow (the top two chemical companies worldwide), Bayer (the 3rd-largest pharmaceutical), and Du Pont. Others are agriculture-specialized industries, such as Monsanto (seed, GMOs), Syngenta (pesticides, seeds), Potash Corp (fertilizer), and Kubota (farm machinery).

Table 5. Size indicators of top global input suppliers, 2007 USD million

| | | Total assets | Foreign sales | Foreign sales as share of total (%) |
|---|---|---|---|---|
| BASF AG | Germany | 44,633 | 49,520 | 58 |
| Bayer AG | Germany | 24,573 | 24,746 | 52 |
| Dow Chemical | USA | 23,071 | 35,242 | 66 |
| Deere & Company | USA | 13,160 | 7,894 | 33 |
| Du Pont | USA | 9,938 | 18,101 | 62 |
| Syngenta AG | Switzerland | 9,065 | 9,281 | 95 |
| Yara International ASA | Norway | 8,009 | 9,939 | 95 |
| Potash Corporation | Canada | 6,079 | 3,698 | 66 |
| Kubota Corporation | Japan | 5,575 | 4,146 | 43 |
| Monsanto Company | USA | 4,040 | 3,718 | 43 |

Source: UNCTAD (2009)

[3] Except for monopoly, the various forms of competition are compatible with wide ranges of participation threshold; an industry with very high concentration ratios, say 80 percent, may have 20 percent of its market share provided by SMEs (small and medium enterprises), and still be regarded as an oligopoly

Table 6. Concentration indicators in agricultural input industries, global markets, 1994 and 2009

| | 1994 | 2009 |
|---|---|---|
| Crop protection chemicals | | |
| CR8 | 28.5 | 53.0 |
| Herfindahl | 398.0 | 937.0 |
| Crop seed | | |
| CR8 | 21.1 | 53.9 |
| Herfindahl | 171.0 | 991.0 |
| Animal health | | |
| CR8 | 32.4 | 50.6 |
| Herfindahl | 510.0 | 827.0 |
| Farm machinery | | |
| CR8 | 28.1 | 50.1 |
| Herfindahl | 264.0 | 791.0 |

Source: Fuglie et al (2011)

Fuglie et al (2011) presents concentration measures for the global agricultural input market (Table 6). The top 8 companies account for over half of global sales of pesticides, seeds, farm machineries, and animal health products; the market share of the top eight has risen substantially over the past 15 years, attesting to rising industry concentration at the global level. The big agricultural input companies tend to be specialized and do not exhibit vertical integration downstream with production. The specialized input companies appear to rely heavily on foreign sales (e.g. Syngenta, Yara, Potash); however this does not necessarily imply domination of cross-border trade, as the sales may have been generated through FDI in overseas markets.

## Production

The top twenty global companies with core business in plantations (including livestock production) as of 2007 are listed in Table 7 . The country most represented is Malaysia (six companies) followed by the United States (five). Two other Southeast Asian countries make the list (Thailand and Indonesia). The other top companies are based in developed countries. All these plantation companies are vertically integrated forward to processing. The processed output is in turn marketed whether domestically or overseas by an integrated international distributor. For the top companies the forward integration may reach as far as branded consumer products, though seldom to the retail level (one exception being CP Foods). The commodity types include fruit crops (banana, pineapple), edible oils, processed food, and non-food products (rubber).

Engagement in international markets takes the form of both foreign investment, with sales directed to domestic markets abroad, or to export markets. The range of FDI exposure of the plantation companies varies widely (2 to 99 percent); likewise the reliance on overseas sales (6 to 99 percent). There is little pattern discernible in FDI or foreign sales.

## Processing

### *Overview*

Food manufacturing firms producing branded products figure prominently to the retail level. The top fifty food manufacturing companies account for 27 percent of global food retail sales (Table 8). Even just the top ten account for over half of sales of the top fifty across most regions; this group includes familiar brand names such as Nestle, Kraft, Unilever, PepsiCo, Cadbury, Mars, and Kellog. The share of the top fifty rises to over two-fifths of food sales in North America. The proportion however falls to 17.1 percent in Asia Pacific (USDA, 2009). Apparently in the latter region there is a sizable presence of large domestic players. In 2008, Dy (2009) counts nineteen companies with sales of one billion dollars or more in Southeast Asia alone; the biggest of these is Wilmar International (sales of $29 billion), followed by CP Group (over $18 billion), and Sime Darby (over $10 billion).

Table 7. Top twenty companies with agricultural production as core business, 2007

| Company | Assets ($ millions) | | Sales ($ millions) | | HQ location |
|---|---|---|---|---|---|
| | Total | Of which foreign (%) | Total | Of which foreign (%) | |
| Sime Darby | 10,879 | 43 | 10,296 | 63 | Malaysia |
| Dole Food | 4,643 | 56 | 6,931 | 60 | USA |
| Del Monte | 2,122 | 83 | 3,366 | 55 | USA |
| Socfinal | 1,285 | 85 | 491 | 94 | Luxembourg |
| CP Foods | 3,012 | 34 | 4,002 | 34 | Thailand |
| Chiquita Brands | 2,678 | 29 | 4,663 | 57 | USA |
| KL Kepong | 2,052 | 37 | 1,487 | 80 | Malaysia |
| KWS Saat | 802 | 72 | 727 | 75 | Germany |
| Kulim | 1,677 | 29 | 829 | 67 | Malaysia |
| Camella PLC | 1,253 | 33 | 322 | 56 | United Kingdom |
| Seaboard | 2,094 | 19 | 3,213 | 71 | USA |
| Sipef | 343 | 83 | 222 | 99 | Belgium |
| Anglo-Eastern | 263 | 99 | 127 | 100 | United Kingdom |
| Tyson Foods | 10,227 | 2 | 26,900 | 6 | USA |
| PPB Group | 3,623 | 5 | 904 | 16 | Malaysia |
| Carsons Cumberbatch | 185 | 56 | 78 | 42 | Sri Lanka |
| TSH Resources | 359 | 26 | 261 | 13 | Malaysia |
| Multi Vest Resources | 121 | 65 | 15 | . | Malaysia |
| Bakrie and Brothers | 1,485 | 5 | 563 | 13 | Indonesia |
| PGI Group | 68 | 96 | 37 | 70 | United Kingdom |

Source: UNCTAD (2009)

Table 8. Share of global packaged food retail sales, by manufacturer, 2007 (%)

| | World | Region | | | |
|---|---|---|---|---|---|
| | | Western Europe | North America | Latin America | Asia Pacific |
| Top 50 companies | 24.6 | 41.9 | 26.2 | 17.1 | |
| Top 10 companies | 15.4 | 25.9 | 17.3 | 5.0 | |
| Nestlé SA | 3.3 | 2.9 | 3.9 | 6.0 | 1.8 |
| Kraft Foods Inc | 2.6 | 1.9 | 7.0 | 1.7 | 0.7 |
| Unilever Group | 2.1 | 3.1 | 2.2 | 2.4 | 0.6 |
| PepsiCo Inc | 1.8 | 0.9 | 4.6 | 3.1 | 0.3 |
| Danone, Groupe | 1.3 | 1.9 | 0.7 | 1.4 | 0.7 |
| Cadbury Schweppes Plc | 1.0 | 1.4 | 0.7 | 1.5 | 0.4 |
| Mars Inc | 1.0 | 1.2 | 1.9 | 0.2 | 0.2 |
| Kellogg Co | 0.8 | 0.5 | 2.3 | 0.8 | 0.1 |
| General Mills Inc | 0.7 | 0.2 | 2.5 | 0.2 | 0.2 |
| Lactalis, Groupe | 0.6 | 1.4 | 0.1 | <0.1 | <0.1 |

Source: Euromonitor (2009), as cited in USDA (2009)

The level of concentration appears to be rising over time, at least gauged from the increasing frequency of mergers and acquisitions or M&A (Muehlfeld et al, 2011). In 1986, food processing firms were involved either as acquirer or target industry in 196 attempted takeovers; by 2006 the number of attempts had risen to 983. A large proportion of attempts involved a food processor as acquirer (73 percent of total attempts); where the acquirer was a food processing firm, most of the target firms were likewise from food processing (45 percent), followed by wholesale or retail (13 percent) followed by agriculture (4 percent).

Concentration levels in food manufacturing are not as high as observed elsewhere in the supply chain. However high market concentration may be observed in specific product lines and regional markets (Table 9). Globally concentration is quite high for breakfast cereal and baby food, with diminishing concentration for confectionary and cheese. Levels of concentration exhibit no clear patterns across regions, though Asia Pacific appears to have lower than average CR4, except for cheese, whereas Australasia, followed by Africa and the Middle East, tend to have higher than average levels of CR4 (USDA, 2009). A case in point is Indonesian food and beverage manufacturing, for which CR4 is 66 percent, while experiencing high price-cost margins over the period 1995 – 2006 (Setiawan et al, 2012a).

Reardon and Timmer (2005) show that foreign direct investments are the primary avenue for globalization of the processed food market. Nevertheless processed food is an important sector in global food trade. On the output side, the share of processed food in world agricultural exports has grown from 32 percent in 1980 to 51 percent in 2006. Developing countries' share in processed food exports tripled over the same period, though this expansion occurred mostly in middle to upper middle income countries, which account for 90 percent of processed food exports from developing countries (Jongwanich, 2009).

On the input side, for some commodities production of agricultural raw material may be sourced from independent suppliers, which may be located abroad. This appears to be the case for some traditional bulk exports such as coffee, tea, and cotton in which raw materials are imported. Large, export-oriented processors would typically have their own distribution activities and allied business interests (see below). The following highlights several commodity cases.

### *Examples*

For the main traditional bulk exports, the review of Poulton (2009) finds the following features of global trade:

Table 9. Four-firm concentration ratios (CR4) in selected food products, 2007 (%)

| | Soup | Breakfast cereal | Baby food | Pet food | Confectionery | Cheese |
|---|---|---|---|---|---|---|
| World | 50.4 | 62.3 | 60.0 | 45.8 | 32.9 | 20.2 |
| Africa, Middle East | 71.5 | 55.9 | 55.7 | 60.4 | 38.3 | 28.2 |
| Asia Pacific | 42.9 | 61.9 | 43.3 | 29.9 | 26.0 | 43.1 |
| Australasia | 91.1 | 87.8 | 91.5 | 59.0 | 74.1 | 70.1 |
| Eastern Europe | 66.5 | 40.0 | 55.2 | 58.2 | 36.6 | 17.5 |
| Latin America | 75.0 | 75.0 | 84.1 | 51.3 | 42.3 | 15.0 |
| North America | 68.3 | 82.3 | 88.0 | 48.6 | 56.8 | 43.2 |
| Western Europe | 55.6 | 61.3 | 73.9 | 45.5 | 37.8 | 21.5 |

Source: Euromonitor (2009), as cited in USDA (2009)

- Cocoa: worldwide there are four main processors in the world chocolate market, three of whom dominate the trade.

- Coffee: Outside the specialty market (i.e. regular coffee), roasting is highly concentrated with CR3 = 0.45 in 2005. Main traders linked closely with the major roasters.

- Tea: there are four main packers in 2005; the biggest may have up to 60 percent share of the global tea market.

In the case of cocoa, processing begins from roasting, to grinding from which a variety of products may result, i.e. cocoa liquor, cocoa butter, cocoa powder, and cocoa cake. The cocoa liquor is further processed into industrial chocolate or *couverture* which is the raw material for finished chocolate. Two-thirds of grinding are done by just ten firms, with the top three – ADM, Cargill, and Barry Callebaut (Switzerland), dominating the market (40 percent share in the grinding market). Interestingly, Cargill and ADM have entered the processing segment fairly recently; they consolidated the activities of traditional trading companies (such as Gill & Duffus, Berisford and Sucden), by displacement or outright acquisition (UNCTAD, 2008).

For tea, the downstream portion of the supply chain is extremely concentrated (van der Wall, 2008). World trade is mostly divided across four companies, namely: Unilever (UK), Van Rees (the Netherlands), James Finlay (UK), and Tata/Tetley (UK). About 90 percent of Western tea trade is controlled by just seven multinational companies. The big tea traders and processors typically own large plantations; however in the biggest tea exporting countries (Sri Lanka and Kenya), tea is now mostly produced by smallholders (respectively, 65 and 62 percent).

Meanwhile for livestock, Dyck and Nelson (2003) note that, while hundreds of firms of various sizes participate in international meat trade, only a few very large firms are market leaders. The global TNCs (as of 2001/2002) supply both the domestic and foreign markets, with seven of the top ten based in the United States. A high degree of market concentration globally can be inferred given high sales concentration among the top fifty; for this sub-group, the CR4 is already 42 percent, and the CR5 is 60 percent. Among developing countries, only Thailand (#36) and Brazil (#37 and #47) are able to place at least one domestic firm in the top fifty.

## Distribution

### *Overview*

On the distribution side, the participation threshold appears high enough to limit access to export markets to medium or large companies (or cooperatives). The threshold is set by throughput requirements for shipping and handling. Buyers may be direct retailers (e.g. supermarket chains), or other agents along the market chain. The large distributors tend to be integrated closely to processing.

The global distribution business is dominated by seven large players (Dy, 2009): Archer Daniel Midlands (USA), Bunge (founded in the Netherlands), Cargill (USA), and Louis Dreyfus (France) – the so-called "ABCD"; together with Continental Grains (Belgium), CHS (USA), and Wilmar (Singapore). Ownership ranges from family-owned (Louis Dreyfus), to relatively dispersed, i.e. CHS is owned by farmers, ranchers, cooperatives, and other preferred stockholders. Activities are tend to be diversified; aside from the core business in global agricultural logistics (Table 10). Wilmar is the only newcomer (founded in 1991); the rest are established businesses founded in the 19$^{th}$ or early 20$^{th}$ century. Wilmar

Table 10. Revenues and business activities of top global agricultural logistics companies (2008)

| | Sales (million USD) | Activities and remarks |
|---|---|---|
| Cargill (1865) | 120 | Grains trading. Agricultural services, processing, livestock production; financial services, industrial products (salt, starch, steel). |
| ADM (1902) | 70 | Grains and oilseeds trading. Largest processor of combined grain and oil seed, and ethanol; flour and corn milling; other commodity trading. |
| Bunge Ltd. (1818) | 38 | Soybean and oilseed trader and processor; consumer foods; biofuels; fertilizer production and phosphate mining |
| Continental Grains (1813) | NA | Grains trading. Feed milling, livestock and poultry production and processing. |
| Wilmar Intl. Ltd. (1991) | 29 | Largest processor and merchandiser of lauric oils; oleochemicals, biodiesels, consumer products; oil palm cultivation |
| CHS (1931) | 21 (est.) | Grains trading. Animal feed, food ingredients, financial and management services; petroleum refining and distribution; food retail |
| Louis Dreyfus Commodities (1851) | 20(est.) | Trading of grain, oilseeds, coffee, cotton, metals, bulk ocean freight, consumer goods (orange juice) |

Source: Dy (2009)

is at the vanguard of Asia-based trading houses now in an expansion mode, including Noble Group and Olam International (Financial Times, 2011).

### *Examples*

In the case of grains, Scoppola (2007) reviews the evidence for a high degree of concentration in world trade. Only a few countries account for a major share of exports; typically their exports are managed by a limited number of firms, whether in the public or private sector. In Canada and Australia, state trading enterprises account for all exports, implying a 24 percent and 38 percent share of world exports of wheat and barley. Even in private sector grain trade only a handful of TNCs account for the bulk of exports. Globally, 15 percent of grain exports are exported by Louis Dreyfus. In the US market just two firms, Cargill and Continental, accounted for 35 percent of US grain and oilseeds exports in the late 1990s. According to Dy (2009), Cargill alone exported 25 percent of grain exports of Argentina.

For rice, Calpe (2007) notes that a large proportion of international trade is conducted through large international trading companies. Volatility in world trade has led to a turnover in the major players. Back in the 1990s, the main rice trading firms were Continental, Richco (Glencore) and Cargill; by the 2000s, these had downscaled or abandoned their rice trade operations. The big companies still in rice trading include ADM, Louis Dreyfus, and Olam. Other major trading companies are mentioned in Box 1. Unlike maize or wheat, rice is not standardized, hence brokers play an important role in facilitating trade. Examples of brokerage houses are: Jacksons, Marius Brun et Fils (Europe); Creed Rice (USA); Western Rice Mills (Canada).

For maize, in the 1990s the global market underwent rapid consolidation, mainly through mergers and acquisitions by grain firms. These tend to be relatively new companies; only a few major companies in the 1980s are still active in the trade (Abbassian, 2007).

Box 1
**Other rice trading companies**

*Ascot Commodities*, (Switzerland), specializing in rice sales to Africa; other Swiss companies include Rustal and Novel.

*Churchgate* (India), active in Nigeria.

*Nidera* (the Netherlands), major operations in Latin America

*American Rice Inc.* (USA) - accounts for about 4 percent of the world rice market; markets . It markets around one fifth of US rice, and also has a joint venture with Vinafood I, one of Viet Nam's major rice exporters

Sources: Calpe (2007); FAO (2003)

Box 2
**Other major vegetable oil traders**

Alimenta SA (Switzerland): among others, a partner of ADM in Golden Peanut Cy, the world's largest groundnut company.

Bunge Group (Argentina): responsible for about a fifth of world trade in oilseeds and oils. It is the largest soybean processor in the western hemisphere, with significant interests in Brazil and Argentina.

Kuok Oils and Grains (Singapore): large operations in palm and coconut oil, and in feed grains.

Nidera (the Netherlands): a family firm trading annually 18 million tons of soybeans, wheat, maize, rice and other grains; major operations in Latin America.

ZenNoh (Japan): the third largest soybean and oil exporter. The federation represents over a thousand cooperatives covering most of Japan's 4.7 million farming households.

Source: FAO (2003)

The main sources of vegetable oils are oil palm, soybean, and rapeseed. Thoenes (2007) notes that the global soybean economy is shaped by a relatively small number of countries and international business conglomerates. Nevertheless he views the market as highly competitive despite high levels of market concentration, and expected consolidation. Some of the large vegetable oil traders (other than the big seven global distributors mentioned earlier) are shown in Box 2.

For fruits and vegetables, the global value chain is characterized as buyer-driven (Fernandez-Stark et al, 2011). The buyers are large supermarket chains in both EU, US, and increasingly in emerging markets. Stringent quality standards are imposed by these chains upon its suppliers, big or small, worldwide. The horticulture industry is increasingly organized by long term relationships and tighter links between producer and exporter firms. The latter consist of a few large transnationals, together with domestic firms of varying sizes.

Exporters may engage small and medium size domestic suppliers as contract growers. Between 1980 and 2000, the low and middle income countries have managed to corner a greater share of fresh produce export market. Recently, developing country exporters are increasingly taking over packing and processing, thereby moving up the value chain. For instance, a wide variety of fruit and vegetables in supermarkets are shipped in as ready-to-eat convenience packs.

## Retail

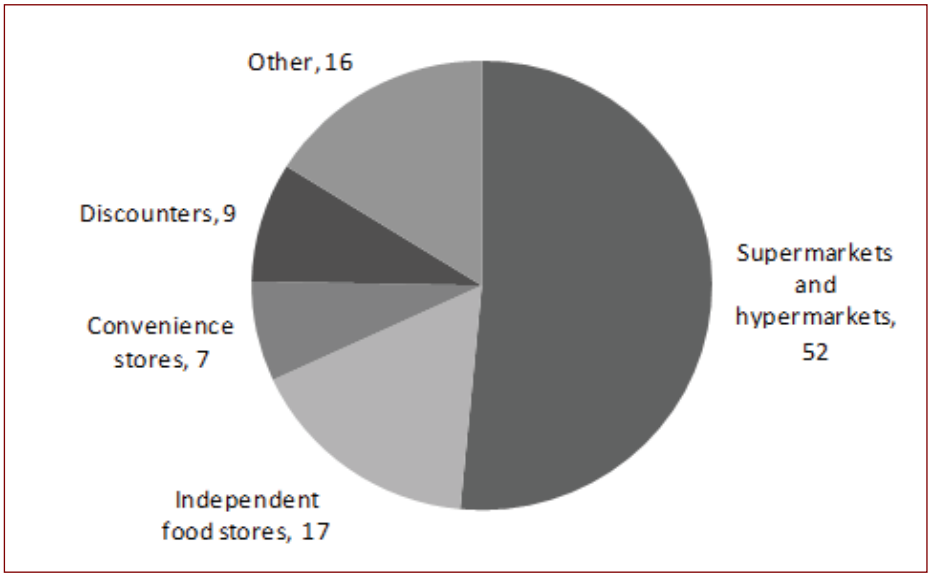
Worldwide the leading form of retail outlet is the supermarket or hypermarket (Figure 3). While modern outlets (supermarkets, hypermarkets, convenience sores, discounters) are seen to be largely a rich country phenomenon, Reardon and Timmer (2007) observe a rapid diffusion of modern retail centers in developing countries since the 1990s.

In Latin America, North-Central Europe, and East Asia (outside Japan and China), the share of supermarkets (shorthand for modern retail) rose from just 10-20 percent of food retail in 1990, to 50 percent or more by the early 2000s. Another wave came in the late 1990s to early 2000s, where supermarkets started from practically nil to about 10-20 percent share in food retail; these include parts of South and Central America, Southeast Asia (e.g. Vietnam), China, and Russia.

The modern retail business appears to be highly concentrated. For hypermarkets the share of the top 15 retailers worldwide is 74 percent; for convenience stores the share is 69 percent, and for discounters, 58 percent. The top retailers are well-known for their global chains, established by extensive FDI in middle- to high-income markets (Table 11).

Based on UNCTAD (2009), retailers with the largest share of revenue from foreign sales are Metro (59 percent), Ahold (55 percent), and Carrefour (54 percent). The world's biggest retailer, Wal-Mart, still depends mostly on its domestic market; nevertheless foreign sales account for 24.2 percent of revenue. TNC retailers source goods mostly from domestic processors; imports account for only a small portion of their products (Dy, 2009). However there has been a growing tendency to use platforms in developing countries to export to outlets worldwide. This is a very recent trend particularly for fresh produce and opens up export opportunities for developing country farmers (Reardon et al, 2009).

Figure 3. Shares in the global food retail market by type of retail outlet, 2009




Note:
1. Supermarkets - selling area 400 - 2,500 m2, at least 70 percent foodstuffs and everyday commodities
2. Hypermarkets – selling area > 2,500 m2, at least 35 percent of selling space devoted to food
3. Discounters - typically 300-900 m2 with < 1,000 product lines (mostly packaged groceries);
4. Convenience shops - selling a wide range of goods with extended hours.

Source: Euromonitor, cited in USDA (2009)

Table 11. Annual sales of top ten global retailers, in $ billions, 2006

| | Annual Sales |
|---|---|
| Wal-Mart (US) | 312.4 |
| Carrefour (France) | 92.6 |
| Tesco (UK) | 69.6 |
| Metro Group (Germany) | 69.3 |
| Kroger (USA) | 60.6 |
| Ahold (Netherlands) | 55.3 |
| Costco (USA) | 52.9 |
| Rewe (Germany) | 51.8 |
| Schwartz (Germany) | 45.8 |
| Aldi (Germany) | 45.0 |

Source: Hefernan (2006)

# 4. DEVELOPING COUNTRY PERSPECTIVE

So far characterization has covered global agro-industry systems and trade. The following shifts to a developing country perspective in examining agricultural trade industry based on focal commodities for which information on market structure is available.

## Major export industries

### *Rice*

The top two exporters of rice are Thailand and Vietnam. Thailand rice exports are mostly done by the private sector, with the top 25 companies accounting for 90 percent of Thailand's exports (Alavi et al, 2011). Contrary to the usual trend toward consolidation, the current set-up is more dispersed compared to the pre-war era; in the 1930s, only five families accounted for 44 percent of rice milled (Goss and Burch, 2001).

Shigetomi (2009) classifies the large Thai rice traders as follows: Group A firms were active in World War 2 or earlier; Group B firms comprised the "Five Tigers" that attempted to wrest control from Group A through cooperation (e.g. sharing of orders); Group C and D firms are those that emerged in the 1960s and 1970s. The latter group are exemplified by Soon Hua Seng, Capital Rice, and Chaiyaporn rice; these exporters are known for pioneering the African Middle Eastern markets.

In contrast, in Vietnam the government maintains a highly interventionist stance. Only 10 percent of exports are from the private sector. The remaining 90 percent is contributed by public sector companies, most prominent being VINAFOOD1 (exports from northern Vietnam) and VINAFOOD2 (exports from southern Vietnam). The latter accounts for 50 percent of the country's rice exports, and is responsible for most public procurement of rice. Exports are tightly regulated through the Vietnam Food Association

(VFA), a government-controlled body, primarily to deflect rice supplies from the foreign to the domestic market. The VFA sets a discretionary minimum export price, which discourages private traders owing to its unpredictability. All export contracts need to be registered with VFA, hence the simple expedient of not recognizing these contracts can prohibit exportation. This transpired in early 2008 when Vietnam stopped private rice exports; in the meantime, VINAFOODS2 continued to export under government-to-government arrangement (with the Philippines), effectively turning into a trade monopoly (Alavi et al, 2011).

### *Vegetable oil export industry*

The largest category in the vegetable oil export market is palm oil, for which the top two exporters are Indonesia and Malaysia. The Indonesian palm oil industry, according to Chalil (2008), supplies 75 percent of its output to the cooking oil industry, which is largely for domestic consumption, leaving 25 percent for export. Supply originates from three sources: government; a private group consisting of ten conglomerates; and smallholders (farm size below 200 ha). The last accounts for only a 40 percent share. Cooking oil is regarded as a food security item; government subsidizes cooking oil, and imposes an export tax on the palm oil industry. The cooking oil industry is itself highly concentrated, with CR4 of 53 percent in 2005 (Muslim, Ertina, and Nurcahyo, 2008).

Unlike in Indonesia, palm oil in Malaysia is mostly exported, with only 10 percent for domestic consumption. As with Indonesia, government retains high levels of state ownership: about 30 percent of palm oil area is run by government agencies. The Federal Land Development Authority (FELDA) alone accounts for about 18 percent of area planted in 2002. About 60 percent of landholdings are under private estates, with estate sizes ranging from a few hundred ha to hundreds of thousands of ha. The PNB, the government's investment arm, owns large portions of equity in some of the industry giants such as Sime Darby Berhad, which has been mentioned earlier as the world's largest plantation company (see Box 3). Less than 10 percent of farms are owned by smallholders (under a rather generous definition of "small", as in Indonesia).

Box 3
**Sime Darby Berhad**

Sime Darby Berhad began with rubber farms in 1910, later diversifying to palm oil and cocoa. Plantations in Malaysia and Indonesia total 630,000 ha, of which 531,000 ha are planted to oil palm. Outside Asia, it has expanded to Liberia, with a 220,000 ha concession planted to oil palm. It is integrated forward to production of crude palm oil, refined palm oil, and branded consumer products such as cooking oil. It has also diversified into real estate and industrial products. The company started out under British ownership, but was acquired by Malaysian investors (including PNB) in the 1980s. In 2007, a merger of three industry giants, namely Golden Hope, Guthrie, and Sime Darby, became what is now known as Sime Darby Berhad.

Sources: Dy (2009); www.simedarby.com.

The next important source of vegetable oil is soybean, for which the top two exporters are Argentina and Brazil. Lopez, Ramos, and Simkievich (2008) deals with the soybean complex in the former. Conveniently, little of soybean production (whether grain or oil) is consumed domestically; hence the industry market structure is the same as for the export market. Over the period 1995 to 2006, the soybean industry exhibited strong growth, with output growing over three-fold to 40.4 million tons, and area more than doubling to 15.4 million ha (half of total area harvested in the country). This period was accompanied by massive consolidation (Table 12).

The Argentinian soybean oil industry is seen to be the most efficient in the world. This is attributed to high farm productivity, owing to

Table 12. Indicators of Argentina export industry, selected years

| | 1995 | 2000 | 2006 |
|---|---|---|---|
| Number of firms | 22 | 27 | 20 |
| Installed capacity (t/day) | 58,902 | 94,258 | 149,318 |
| Exports per firm (tons) | 66,931 | 116,385 | 303,917 |
| CR5 | 53.0 | 66.6 | 80.0 |
| CR10 | 87.8 | 90.9 | 98.5 |

Source: Lopez, Ramos, and Simkievich (2008)

use of latest technologies (transgenics, and zero tillage); large scale of its plants (90 percent of oil is processed in plants with average capacity of 7,500 tons/day); and proximity to ports (on average, production is only 300 km from the nearest port).

Similarly in Brazil, the industry underwent rapid concentration since 1995, with the acquisition of large domestic firms by four multinationals, namely Bunge, Dreyfus, ADM, and Cargill. The CR4 rose to 43 percent in 1997, from 31 percent in 1995. In crushing, the CR8 reached 55 percent compared to 47 percent in 1995 (Thoenes, 2007).

### *Orange juice export industry*

Brazil is also a prominent fixture in the global orange juice industry, being the second largest producer worldwide. In the major traded product, frozen concentrated orange juice, the country accounts for over 80 percent of total world trade. Growth of export production averaged about 1.8 percent per year in 2001 – 2007. The industry generates about $4 billion a year and provides employment, directly or indirectly, to over 500,000 people. The export market is strongly concentrated: in 2001 the CR4 was 66.7 percent; by 2003 the ratio had risen to 78.2. By 2007 it may have reached 90 percent.

About 80 percent of harvested oranges are sold to processors (the remainder going to the fresh fruit market). Oranges for processing are mostly obtained from contract farmers, accounting for 55 to 65 percent of the export industry's output. Contracts are either on a fixed price basis (majority of contracted oranges), or flexible price (combining both a fixed and varying component depending on world prices). The next most important source is company-owned orchards (18 – 22 percent). The remainder is made up of other supply schemes, i.e. lease arrangements, partnerships, etc. (Neves, 2007).

### *Meat export industry*

As mentioned earlier, of the top meat producer companies the only developing country firms are from Brazil and Thailand. For the former, concentration ratio for the export industry is available from Jank et al, (2001). Exports of poultry remained highly concentrated, with at about 82-85 percent in the 1990s. Concentration in the domestic market is not as high but has been increasing over the same period (CR5 of 32 percent rising to 38 percent). Meanwhile for pork the domestic concentration ratio rose from 61 to 68 percent. There is however an important exception in the trend of rising concentration, and that is for beef; concentration has been falling based on CR4 (55 percent down to 48 percent from 1990 to 1998). At the same time, the beef sector also suffered a decline in export volume.

In the case of Thailand, there is less evidence of rising concentration during a period of rapid production growth (4.3 percent annually from 1983 to 2001) In 1981, the CR3 was 92.8 percent; the top exporter then was CP Bangkok Livestock Trading, part of CP Foods (Box 4). At the time only 7.6 percent of output was exported. By 2003 up to 69 percent of broilers were exported as foreign markets became the main driver of demand. The market is controlled by a few integrators who span the supply chain from grandparent stock breeding to the export market. Nevertheless the CR3 declined to 52 percent

Box 4
**The case of CP Foods**

CP Foods is one of the largest integrated poultry, livestock, and aquaculture producers in the world. It is engaged in the production of feeds, animal breeds, raising of livestock, poultry, and fish, as well as food processing. Its associated business (CP All) has a significant retailing presence in Thailand and serves as outlet for its branded food products.

The business was established in 1923 by Chinese immigrants as an agro-input company, later expanding to feeds in the 1950s. In the 1960s is pioneered contract growing of poultry in Thailand to stoke demand for its animal feeds; it also established a poultry processing plant as well as provision of breeds, veterinary inputs, and financing. The "defining moment" of agribusiness expansion, not just for the company but for Thailand as well, was the entry of its poultry products into Japan in the 1970s. In the 1980s it branched out to aquaculture. As of 1993 the company had become the world's second largest poultry producer, the the third largest producer of animal feed, and the largest producer of prawn feed. It is the largest agribusiness company in Southeast Asia, with significant investments outside Thailand, particularly in China.

Sources: Burch (2010); Goss and Rickson (2000)

(Poangpongsakorn et al, 2003). It is possible that as the broiler market grew, new firms entered, or some of the older companies managed to grow and take away market share from the older players. Production also appears to be concentrated, with farms of over 2,000 birds accounting for the bulk of all broilers. Very large scale production and high efficiencies were introduced through new technologies, mainly EVAP (evaporative) systems, which introduces strict temperature and environmental controls within closed facilities (Costales, 2004).

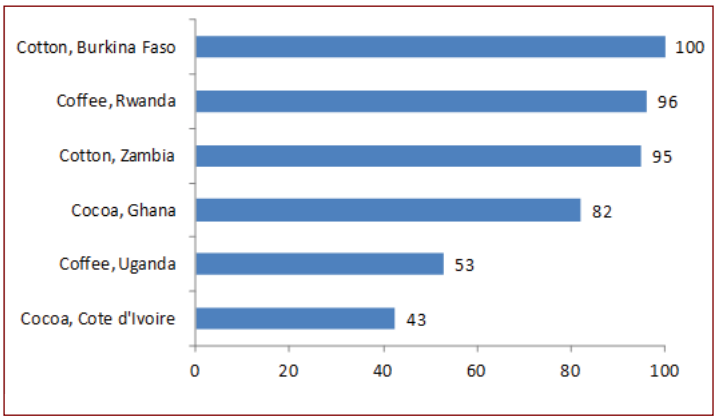
## Africa country cases

In the foregoing the discussion has been organized around large developing country exporters, who are all from Asia and Latin America. The following shifts the discussion to Africa given its potential for sustained growth through modernizing value chains.

### *Bulk commodities*

African exports have often been associated with bulk commodities, e.g., cotton, coffee, and cocoa, which have been analyzed by Porto, Chauvin, and Olarreaga (2011), on which the following discussion is based. The export supply chains tend to be concentrated, most strikingly for cotton in Burkina Faso and Zambia, as well as and coffee in Rwanda (Figure 4).

Figure 4. Export supply chain concentration ratios, selected countries




Source: Porto, Chauvin, and Olarreaga (2011)

Note: Concentration ratios are CR4, with the exception of Cotton, Burkina Faso, which is CR3

In Burkina Faso, cotton is the main cash crop and accounts for 40 percent of all exports. Most cotton farms are small-scale (3 – 5 ha). Nearly all cotton lint is exported, mainly to Southeast Asia (66 percent). Production is "semi-privatized", with private sector involvement commencing in 1998 when government sold some of its shares to the domestic producer's organization. Until recently price-setting has been guided by a guaranteed base price set in the previous year; currently a more flexible scheme is in place, though price fluctuations trigger payments from a stabilization fund.

Cotton is one of Zambia's most important cash crops, involving 11 percent of all farmers, most of whom are small-scale. Until 1994, processed cotton production was dominated by LINTCO, a state-owned monopoly. Following break-up and liberalization, the sector underwent rapid growth, expanding five-fold in just three years, but more slowly and erratically thereafter. The sector remains highly concentrated, with Dunavant and Cargill as the biggest players (accounting for 76 percent of exports). In 2006, exports contracted owing to rapid currency appreciation; the largest farmer organization, the Cotton Association of Zambia, attempted to negotiate for the first time the prices paid by ginners.

Coffee (Arabica variety) was the main export commodity of Rwanda during the colonial period. Upon independence coffee exports were under the Rwanda Coffee Authority, a state monopoly. In the 1990s liberalization was pursued; since then coffee marketing board has withdrawn from commercial activity, although it continues to issue licenses for coffee traders, provides certification on quality standards, and distributes seedlings and insecticides. Production is in the hands of 400,000 smallholders; there is no large estate farm in the coffee business.

Meanwhile in Uganda most of the coffee grown (90 percent) is Robusta. It used to account for nearly all of the country's export income; currently it still employs 500,000 smallholder families and accounts for a fifth of export revenues. All exports were previously under a state monopoly, called the Coffee Marketing Board (CMB). In 1991, the monopoly was abolished; the CMB continued to operate as a commercial entity, CMB Ltd. Regulation and licensing is spun off to a separate government entity, the Uganda Coffee Development Authority (UCDA). Over 90 percent of exports are handled by 10 companies; roasting is even more concentrated, with only four companies registered under UCDA.

For cocoa, Africa is the largest supplier, accounting for about 72 percent of global production in 2005. Whereas about 90 percent of the world's cocoa output (since the 1990s) was produced in smallholdings under 5 ha., the export market is heavily concentrated. In Cameroon for example, over 60 percent of exports in 2006-2007 were handled by just four exporters. The major exporters in Cameroon are subsidiaries or otherwise closely tied to the transnationals handling world cocoa trade (UNCTAD, 2008). The same global traders tend to integrate vertically into processing; very few international firms specialize solely on trading. Most of Africa's cocoa is exported to the Europe for processing into chocolate.

The top cocoa exporter worldwide is Cote d'Ivoire, accounting for 40 percent of global supply. Cocoa is a major source of employment, providing jobs for 35 percent of all households. Upon independence, a state monopoly was established to regulate producer and export prices. A series of reforms commenced in the 1980s, culminating in full producer price liberalization and abolition of the state agency in 1999. The export share of the top 14 firms rose from 75 percent to 85 percent over a three-year period (2000 – 2003). Some of the TNCs in exporting managed to integrate backwards to processing. Despite liberalization, the export sector bears an onerous tax burden, from which government derives one-fifth of its total revenue.

At second place is Ghana, previously the world's top cocoa exporter, and still responsible for one-fifth of global supplies. Since the late 1940s marketing was monopolized by the Cocoa Marketing Board, which also provided input subsidies, extension services, even road construction to cocoa-growing communities. From the late 1980s, the domestic market was liberalized, allowing licensed private traders to operate; input subsidies were scaled down. However the sector remains tightly regulated, and exports remain a state monopoly. Licensed traders can be divided into four groups: government; domestic private sector; farmer-based (under a fair trade cooperative); and international. The latter is composed of just two companies, namely Olam (Singapore) and Armarjaro (Britain). The government

reduced its market shares in recent years; market shares of the cooperative and international companies have also fallen, whereas that of the domestic private sector has increased.

### *Fruit and vegetable exports*

In decades, diversification has gradually been underway from traditional bulk exports to horticultural crops. In Kenya, the fresh fruits and vegetables sector accounts for nearly $1 billion worth of exports, or 21 percent of export revenue. During its rapid growth period (1970s to the mid-2000s), production was smallholder-based, accounting for 60 percent of exports by 2004. Output is then funnelled to about a dozen exporters with their own packing installations and modern logistics, including cold chains. These exporters are all domestically based; foreign firms play a limited role, e.g. Del Monte has specialized in pineapple production and processing. Similarly in Morocco, fruits and vegetables are a billion dollar industry; by 2007, only seven exporters accounted for 70 percent of fresh fruit and vegetable exports of Morocco. The top five firms are all vertically integrated throughout the chain, from production, to logistics, and marketing (Fernandez-Stark, 2011).

Fresh fruits and vegetables are now the fourth main primary sector in Senegal, with specialization in French beans (42 percent of export volume of the sector) and cherry tomato (23 percent of export volume). Only a dozen companies account for 40 percent of French beans and 82 percent of cherry tomato market. These companies are almost all domestically-owned; there is one large TNC operating in the country, which mainly exports tomatoes (Maertens, 2009). Somewhat at the extreme is the case of Madagascar highlands vegetables; almost 10,000 farmers produce high value vegetables for export, but most exports pass through just one company. The company sells 2/3 of its produce to European supermarkets; of this, half of this is sold to seven main supermarket chains.

## The import side: parastatals in developing countries

The discussion has so far focused on the export side of agricultural trade industry. The earlier discussion on global distribution partly relates to imports, as the large distribution companies also handle imports for developed countries. Systematic market structure analysis of the import side of trade is however much sparser than that of export side.

Available information on market structure on the import side for developing countries often relates to the regime of marketing boards. This kind of structure reduces to monopoly (similar to the export marketing boards discussed above for bulk commodities). For importables, the commodity covered typically included the major grain staple; other commodities deemed crucial for food security were also covered.

In addition to import monopoly, marketing boards would often also impose price restrictions, quantity restrictions, and engage in direct marketing activities. Table 13 presents some cases from developing countries.

Table 13. Marketing boards for importables in selected developing countries

| Country | Intervention |
|---|---|
| Ethiopia | Grain trade controlled, ban on private trading; producer quotas; distorted prices |
| Mali | Monopoly parastatal for coarse grain and rice (lifted in 1980s) |
| Tanzania | Monopolistic parastatal for maize; coffee board controlled marketing, provided credit, extension |
| India | Food Corporation of India has import monopoly over cereals |
| Indonesia | Bulog stabilizes prices for strategic foods (rice, sugar, cooking oil); import monopoly |
| Philippines | National Food Authority has rice import monopoly, maintains buffer stock, price stabilization |
| Mexico | Parastatal maintained producer prices, subsidized inputs and consumer prices (eliminated 1995) |
| Colombia | *Federacion* controls coffee marketing |

Sources: Lundberg (2005); Rashid et al (2008)

# 5. AGRO-INDUSTRY TRADE STRUCTURE: CAUSES AND CONSEQUENCES

Having characterized the organization of global agro-industry, discussion now turns to the causes and consequences (particularly for equity) of such industrial organization. Following the schema, the following issues are addressed, namely: horizontal integration (market concentration), vertical integration; and the international dimension of industrial structure.

## Perspectives on market structure

### *Institutional economics and mainstream economics perspectives*

Much of the concern with horizontal integration relates to the sheer size, and corollary fears of economic "power" leading to skewed distribution of economic benefits and wealth. Concerns over power in economic relations are a basis of the institutionalist critique of the market economy, which emphasized the acquisition and exercise of power, in its political economy sense. The objection posed by prominent civil society organizations such as Oxfam e.g. SAC (2012) to some extent derives from this critique.

An institutional economics approach may consider vertical integration as an extension of market consolidation by big business, asserting control over its input suppliers and downstream buyers even more complete than through the exercise of market power. Finally, firms may opt to expand their markets in terms of either materials sources, or product outlets, leading to an international dimension in their exercise of power.

Mainstream economics does take seriously the possibility of departure from price taking behavior associated with perfect competition. The earlier "structure-conduct-performance" (SCP) school of industrial organization popular in the 1950s and 1960s, saw market concentration as a source of "market power" in the sense of an ability to influence the market price. This in turn permits the dominant firms to earn above-normal profits.

However later studies probe deeper into the extent and degree competition despite high levels of observed concentration, as well as explanations of concentration other than *ad hoc* explanations based on "power". For instance, Demsetz (1973) notes that the correlation of above-normal profits in concentrated industries need not be due to market power, but rather to production efficiencies that allow firms to realize lower costs. This perspective is not unique to economists; agribusiness researchers also tend to view firm and commodity system governance structure and strategy decisions as responses to technological, demographic, and social changes at the institutional environment (Cook and Chaddad, 2000).

### *Horizontal integration*

For horizontal integration, the main explanation from mainstream economics is *economies of scale* and *barriers to entry*.[4] One class of entry barriers is policy-induced, perhaps inadvertently. For instance, import licenses may impose minimum standards on logistics facilities under the licensee's ownership. This may exclude other companies who are capable of importing without meeting the asset requirements (e.g. they are able to outsource their logistics).

However regulation is not the only source of entry barriers. A firm may enjoy differential access to technology owing to secrecy or patent protection. An important entry barrier is sunk cost. Such cost can be endogenous, e.g. when a firm selects the level of capacity or R&D investment, with greater capacity or investment being associated with superior product qualities or sharper product differentiation (Sutton, 2007). Other forms of sunk cost include: outlays for physical capital, i.e. cold chains, farm-to-port roads, etc.; or investments in intangibles, such as brand reputation.

### *Vertical integration*

As with horizontal integration, vertical integration (and its variants) need not be merely an extension or manifestation of market power, but rather may be explained by a deeper economic rationale. The agency literature is based on private knowledge known only to one party, typically an agent expected to undertake a certain action (Sexton and Lavoie, 2001). If the private information is a property of the agent (e.g. being a high-cost producer) then the problem reduces to adverse selection; if an unobserved choice of the agent, the problem is one of moral hazard. This strand of literature formulates coordination as a principal-agent problem in which the principal, acting as a Stackelberg leader, proposes an incentive scheme for the agent. The scheme maximizes the principal's objective function, subject to an incentive compatibility constraint (the agent also maximizes his or her pay-off function given the scheme) and a participation constraint. The incentive scheme can incorporate a variety of features, such as nonlinear payment (e.g. penalties for delivery below a quota) and quality standards.

Another strand is the transaction cost theory of the firm. As summarized by Klein (2005), agreements between transacting parties run into a complex set of risks and circumstances. Contingencies cannot be fully anticipated leading to incomplete contracts, where adapting (or failing to adapt) to unexpected contingencies introduces transaction costs. A particularly acute problem is that of asset specificity: when two parties invest in assets which generate higher value when combined than when separated, the possibility of holdup arises in which one party would threaten exit to extract rent from a joint activity.

[4] The theory of "contestable markets" (Baumol, 1982) has shown though the latter factor is the more fundamental basis of market power. According to this theory, in the absence of sunk costs, entry and exit barriers, and identical technologies, large incumbents (who may enjoy economies of scale) may still behave competitively owing to the threat of potential (rather than actual) entry.

Transaction cost theory is fairly general as it is essentially a study of alternative governance structures to address the incomplete contracting problem. The three basic types of governance structure are markets, hierarchies, and hybrids. Within this literature, the contrast is often made between high powered incentives offered by market prices, but with risk of holdup; hierarchies are an extreme solution as it simply vests ownership of assets in one party to eliminate holdup (while eliminating or attenuating the high powered market incentive). Alternatively, partial alignment is available from a hybrid form such as a franchise, long term contract, network, or other arrangements, which seek to combine high powered market incentives with protection for specific investments.

## Drivers of agribusiness consolidation

Reardon and Barret (2000) identify a set of factors classified under "meta trends", "global changes", and "developing country changes", together with "indicators" of outcomes. In the following this list serves as take-off point for identifying *supply drivers*, *demand drivers*, and *changes in the policy and institutional environment*, as factors underlying increasing concentration both horizontally and vertically.

### *Supply drivers*

Hayami (2002) has argued that in general small family farms are economically efficient compared to plantations, up to the level of primary production. Rather, economies of scale are found downstream at the processing and marketing stages. To account for plantation agriculture, he reviews historical experience showing that, during the colonial period, industrialists sought to expand sources of raw materials from the territories. Plantations had to be established often in unsettled or sparsely unsettled areas with little or no infrastructure or facilities. Establishment of plantations and farm worker family communities then had to be internalized by plantation firms, accounting for large estate sizes to justify the enormous capital outlays. This implies furthermore, that family farms are efficient as long as settlements are already in place, with access to public and quasi-public goods such as road infrastructure, utilities, community facilities, and so forth – provision of which is normally the role of the public rather than private sector.

Technological change has furthermore transformed each stage of production in the value chain, increasing the degree of scale economies (e.g. capital requirements), intensifying consolidation. Technological change affects the chain all the way back up to the input stage, where biotechnology and improvements in chemical processing has raised the profile of some transnational seed and other input suppliers (Reardon and Barret, 2000). In distribution and retailing, a major driver is technological change in logistics and information, requiring further capital outlays and larger scale of operations. Improvements in shipping and storage technologies in the 1980s allowed shipping of fresh produce from the southern hemisphere to northern markets. Modern logistics platforms allows large volume procurement, with its geographic reach widened by modern telecommunications. Computerized systems of supermarket chains permit reduction of inventory, paperwork, and accelerated order cycles, with heavy reliance on automated processes (i.e. barcodes) and electronic data interchange. Lastly, procurement tended to be more centralized within each chain: while this increases transport cost, the transaction costs are reduced as the system allows automation, coordination between warehouses and outlets, and other best practices in storage and logistics (Reardon and Timmer, 2007).

### *Demand drivers*

The major demand drivers involve shifts towards preference for modern retail service outlets (Reardon and Timmer, 2007). One is rising per capita real incomes and an expanding middle class, particularly in some fast-growing developing countries. Diet diversification would naturally result owing to Bennet's law (declining share of staple food in calorie intake as per capita income rises). It is furthermore possible or even likely that consumer preferences are shifted towards these modern products and retail services, owing to their wider availability, as well as aggressive promotional and advertising efforts.

Another is growing urbanization and separation of households from farm production, as well as entry of women into the workforce, thereby raising the opportunity cost of home production and food preparation. Falling prices and greater availability of cars, modern transport, and modern appliances also play an important role in shifting preferences away from having to shop daily in traditional retail outlets. These drivers together fueled demand for greater variety of goods, of high quality and safety, as well as of convenience foods. This in turn motivated the modern retailers (i.e. supermarkets) to source processed food products mainly from large scale manufacturers to reduce transaction cost, maintain product flow, and provide quality assurance. Hence in the 1990s and 2000s, a wave of consolidation transformed food processing through merges and acquisitions of small and medium size companies, transnationalization through FDI, and specialization among the surviving smaller processors in market niches (Wilkinson, 2004).

### *Policy change*

Changes in policies have likewise been a key determinant of market concentration and production relations. Plantation agriculture underwent a dramatic transformation from the colonial period, where little domestic processing took place. In the 20$^{th}$ century, many large plantations were dismantled by nationalization policies, land reform, and related restrictions. While large farm producers still persist, they now mostly operate through non-equity forms such as contract farming, opening up participation in the global chain to small farmers. In Southeast Asia and other regions, several plantation-based companies have transitioned to domestic manufacturing during the nascent industrialization phase of their host countries (UNIDO, 2009) .

In a set of case study countries reviewed in Reardon and Huang (2008), in the mid-20$^{th}$ century traditional food systems were transformed by a wave of public sector interventions; this has been reviewed earlier in the discussion of parastatal controls over export and import trade. The brunt of intervention fell on pricing and marketing, but was also felt in FDI restrictions in manufacturing. These would eventually give way to liberalization, also typical of many developing countries. Stabilization and structural adjustment programs from the 1980s onwards led to downsizing, or outright dismantling or privatization of parastatals, repeal of price controls, and restrictions on geographic movements of goods. Subsequently processing and later, retailing was opened up to FDI, which proved decisive in restructuring of the agro-food industry, in retail and food manufacturing.

Previously, section IV presented some real world examples of policy evolution from parastatals to more open trade in many developing countries. Nevertheless, government intervention in agricultural trade in selected crops and countries persists, with a tendency to monopolize trade under a parastatal agency. Interventions may be motivated by food security (i.e. insulating the domestic market from global instability in supply or price), or even strategic trade policy i.e. export subsidies or other interventions for exploiting imperfect competition in international trade (Branden and Spencer, 1985).

### *Institutional change*

As a response to, and further reinforcing the abovementioned drivers, is institutional change and restructuring among market participants. One interesting development is the adoption of grades and standards by private sector players on a more systematic basis; and increasingly, on an industry-wide basis (Reardon et al 2001). And while technological change and scale economies are leading to consolidation on one hand, specialization in logistics and distribution has motivated retail chains towards outsourcing of logistics and distribution, often under joint venture arrangement.

The most crucial transformation in institutional arrangements is the shift away from traditional spot market-type transactions towards more vertically coordinated contractual or at least relational arrangements in modern supply chains (Reardon and Timmer, 2007). For retail chains, procurement has shifted towards specialized, nontraditional wholesalers, especially for fresh produce. In case of imported produce, they tend to rely increasingly on specialized importes with similar function as nontraditional wholesalers. These nontraditional wholesalers exclusively cater mainly to supermarkets and specialize in a product category. Through these specialized wholesalers the large retailers enforce their exacting product and delivery requirements, all the way down the supply chain.

## Effects

The effects of horizontal concentration and vertical integration/coordination in agro-industry trade are analyzed in terms of market power, equity, and innovation, for which quantitative assessment is based on indicators. For market power the main indicator is price-cost mark-up, i.e. the excess of marginal cost over price as a proportion of price.[5] Alternatively one may examine symmetry in foreign-to-domestic price transmission. Equity may be gauged by share in total value added by stage in the value chain; and benefit in terms of employment or earnings for small farmers, farm workers, and rural poor. For innovation the usual indicators are (changes in) total factor productivity, partial factor productivity, or technical efficiency. Some of these indicators are only loosely related to the effects they are intended to measure, as shall be made clear in the discussion below, though given scarcity of empirical work these seem to be the more common indicators reported.

### *Market power*

The first inference from market concentration is market power. However as discussed previously, market concentration does not necessarily imply departure from competitive behavior, as concentration may be attributable to deeper economic rationale. The presence and strength of market power should first be established, and only then related to concentration.

In the area of international trade, Morisset (1998) finds that transmission from world to domestic prices exhibits a curious asymmetry: there is a greater tendency for increases to be transmitted compared to declines. He interprets this to be the result of the exercise of market power by large global trading companies. Similarly, Sexton et al (2007) cite the case of Mozambique cashew where export taxes were lifted, but pass-through to farmgate prices was far lower than earlier projected; this is attributed to monopsony power on the part of traders, who managed to capture most of the gains from lifting the export tax. This case illustrates their argument for incorporating market power in evaluating the impact of agricultural trade liberalization, which they substantiate using simulation modeling.

[5] Technically known as the Lerner index. A zero value implies a competitive market.

However direct empirical evidence is at best mixed. Sheldon and Spirling (2003) compiles estimates of the mark-up over (marginal) cost as percentage of price. Industries with low to moderate mark-ups are: US sugar (0.05), US textiles (0.05), Canadian food processing (0.12), German bananas (0.18). Meanwhile industries with high mark-ups include: US tobacco (0.65), UK bread (0.84), US livestock oligopsony (1.10). Market power is evident in some of the more heavily concentrated industries, but high levels of concentration are also consistent with moderately or even highly competitive environments.

Consider some developing country examples (also covered in Sheldon and Sperling's review): the rice export market has a mark-up of 0.11 (Karp and Perloff, 1989); cocoa in Cote d'Ivoire has a market-up ranging from 0.25 to 0.37 (Wilcox and Abott, 2004); and Philippine coconut oil reaches a mark-up of 0.89 up to the 1980s (Buschena and Perloff, 1991). Again there are variations from moderate to high. The last two country cases highlight the role of government policy; in both cases the subject country was a dominant producer of the export crop; export taxes and other restrictions allowed the industry to exploit the country's market position.

However it is unclear whether the quest for market power is a reliable guide for policy given the prospect of new entries, and (particularly for coconut), the prevalence of substitute products. Reimer (2006) finds that international food and agricultural markets do exhibit oligopolistic behavior; however the price-cost mark-ups are small or non-existent. This leaves little or no basis to pursue strategic trade policy. Branden and Spencer (2008) themselves downplay the activist stance, advocating multilateral trade disciplines precisely to prevent strategic "beggar-thy-neighbor" policies.

So far the focus has been on horizontal market structure. The relationship between market power and vertical integration has been long been suspected, though only recently been the focus of empirical work. For instance, in contract farming systems, buyers can coordinate to avoid strategic default by suppliers. This may create informal cartel-like arrangements to exchange information about their borrowers and prevent side selling (Swinnen and Vandeplas, 2006). In the US soybean seed market, biotech firms are endowed with market power in terms of intellectual property over parent material. They may either license production to seed companies, or integrate forward to seed production. A quantitative analysis confirms that vertical integration strengthens market power in a differentiated seed industry; vertical integration tends to raise mean seed price by 1.87 to 13.6 percent (Shi and Chavaz, 2011).

### *Equity and inclusiveness of value chains*

In an industry with identical average costs, a high concentration ratio implies concentration as well of profit among a few firms. It is not necessarily the case though that gross returns per unit capital is higher in these industries; furthermore the implications for the size income distribution requires further analysis of ownership structure. Inequality has also been characterized along the value chain. According to Moir (2007), coffee producers account for 10 percent of value added of the finished product, whereas processors, roasters, and retailers may receive between 20 to 30 percent; the split is similar for cocoa, where producers may receive about 15 percent. Banana, despite low levels of processing, likewise generates just about 10 percent of value added for plantations, whereas retailers may receive up to 40 percent. If however such concentration of income or value is an outcome of efficient market relations, then attempts to force more "equitable" outcomes may introduce distortions that undermine allocative efficiency. This is precisely the argument by Gilbert (2008); he finds that the value shares in the coffee and cocoa value chains, though apparently skewed against producers, is not the outcome of market power, and should not be the object of countervailing regulations such as antitrust measures.

Related to equity is another significant pre-occupation in the literature, which the degree to which small producers are included in agro-industrial value chains. Research under this rubric has witnessed an explosion of studies over the past decade. Expanding on the framework in Section 3, the following may be posited:

i) There is a minimum efficient scale of production that tends to exclude the smallest farmers from supplying to modern agro-industrial value chains.

ii) Farmers can group into associations, e.g. cooperatives, to realize economies of scale and supply to modern value chains under closely coordinated arrangements by contract.

iii) Farmers who gain access to the value production in the modern chain is better off than the farmer supplying the traditional trading outlet. In this manner the rise of the modern value chain may be contributing to poverty alleviation.

Watanabe et al (2009) offer a macro level view of the impact of agro-processing on poverty in the case of Thailand. They use education (less than half of mandatory schooling attainment) as a proxy for identifying the poor. Using national input-output data combined with the labour force survey, they find that agro-processing industry employs the largest number of the poor among the manufacturing industries, High employment contribution for the poor is due not only due to the large size of the industry, but also the higher intensity of demand for labour of the poor.

Most of the relevant studies in this field however rely on micro case studies. Results from ten case studies in developing countries is summarized in Huang and Reardon (2008). For horticulture crops studied, average farm sizes are small in nearly all the countries, falling to as low as 0.5 ha in China, with a one ha or so plots being somewhat typical. Accordingly, in six out of ten cases, evidence of small farm exclusion from the modern market channels is absent.

What varies substantially however is access to productive assets. Productive capital is the clearest and strongest variable affecting access to modern channels. Cooling tanks, herds, greenhouses, and irrigation investments - assets affecting quality, consistency, and volume – are found to have the most significant effects. In contrast, variations in human capital – schooling, age, and experience – were less pronounced among modern chain suppliers. Lastly, evidence on the importance of group membership is mixed. In only half of the cases, groups such as associations or cooperatives facilitated the participation of their members in the modern chain. Of these, only in two cases was cooperative membership found to have a positive effect.

The importance of endowments is exemplified by the fresh fruits and vegetables industry in Kenya (Fernandez-Stark et al, 2011). Land redistribution policies created a smallholder system throughout the country; cultivators, already owning their own family plots, were favoured by a good climate as well as access to modern technologies such as irrigation facilities and greenhouses. Furthermore market linkages opened up opportunities through ethnic and family ties among South Asians in Kenya and UK.

Meanwhile, the case of Madagascar vegetable exports presented earlier in Minten (2009) illustrates the importance of institutional support along the supply chain. In this case, such support may even supplant farmer organizations as well as other disadvantages of the business climate (inadequate infrastructure, resource-poor cultivators, etc.). Individual farmers are intensively supervised by the main exporter; about 300 extension employees supervises about 30 farmers, who in turn coordinates

about 5-6 extension assistants residing in the village. Every farmer is visited more than once a week, to ensure correct production management and avoid side-selling. For some aspects, such as pesticide application, company reps may even intervene directly in farm production.

However, buyer support may not be sufficient to ensure participation of small farmers. On on average, heads of contract farm households are better educated. About 64 percent have finished primary schooling, compared with 50 percent illiteracy rate for the average household. Contract farmers have been supplying regularly for an average of 8 years; 27 percent are members of a farmer organization. Small farmers that participate in these contracts have higher welfare, mainly realized through better income stability and shorter lean periods. Contract farmers tend to adopt better farm technologies (e.g. composting) that spill over into on the productivity of the staple crop rice. The case highlights the following: very poor farmers, in a low income developing country with poor institutions and infrastructure, and facing a monopsonistic marketing company, can benefit very significantly from integration in global value chains.

Other contexts point to the importance of farmer organizations or change agents for community organizing, e.g. through an NGO. Agro-industrialization in China has strengthened farmers' access to the modern agrofood chain via farmer professional cooperatives (Jia et al 2010). An NGO case is described in Escobal and Covero (2011), for agro-industrial demand for potato as chips for food manufacturing in Peru. The agro-industrial chain offers an alternative marketing channel to the traditional market. The main industry firm has the incentive to source high quality potato from an area (Mantaro Valley) during the potato off-season. However, the highly fragmented and disperse nature of farm land in this area adds huge costs to vertical integration. Instead, it opts to deploy existing farmers in the Valley as suppliers. The firm contracts directly with medium-size growers, but also contracts with small producers through an NGO intermediary. The NGO reduces monitoring costs, and provides access to technical assistance and new marketing opportunities for small farmers.

The producers selling to the agro-industry have on average two more years of schooling than those selling their crop elsewhere. Also, their average land holding is also greater (more than double), as well as the average value of their productive assets. Small farmers benefit from guaranteed sales and predictable time horizons of production sales; they experience a 76 percent gain in net income per ha for shifting from traditional spot to modern contractual arrangement. This illustrates, among other cases that some degree of outside financial and technical assistance, is often required for producer groups to form and operate successfully.

However, this can introduce problems with sustainability Markelova et al (2009) highlight the issue of dependency on external assistance, well as the need for public and private sectors to sustainability through policies and programmes that allow farmers to access stable and competitive markets. In general, across various commodities and countries, contract farming is characterized by high turnover from one year to the next, both on the buyer's side and on the supplier's side. This is both a source and an effect of contract risk; unfortunately little is known about medium to long term sustainability of participation (Barrett et al, 2011).

Exclusion of small farmers does not however entirely preclude participation of the poor. Based on the case of Senegal, Maertens (2009) demonstrates that modern chains employ a significant number of workers – in fact for every one smallholder farmer selling to the chain, there are fifteen workers in the fields and processing centres. Earnings from employment in the horticulture export industry are invested in part in the farm, ultimately raising farm incomes through alleviation of credit and input constraints.

In short, analysis of welfare implications of horticulture exports and agro-industrialization should also pay attention to indirect, off-farm linkages.

### *Innovation*

Another important strand of literature relates horizontal or vertical consolidation with technology or technical efficiency. Under the Schumpeterian thesis, innovation is associated with larger firms, and therefore higher concentration; however the "quiet life" hypothesis relates high concentration with lack of competition and weaker drive towards innovation. For Indonesian food and beverage manufacturing, higher industrial concentration is associated with greater technical inefficiency, tending to confirm the latter hypothesis (Setiawan et al, 2012b). This contrasts with an earlier finding by Karantinis et al (2008) which detects economies of size in product innovation, for the case of Danish food manufacturing. Moreover, the greater the market power of a firm, the more products it tends to introduce, i.e. it tends to be more innovative. Firms which indicate higher vertical integration tended to innovate more.

The relationship between vertical coordination and innovation has been explored under the more general rubric of "vertical spillovers". Gorg and Greenaway (2004) examines spillover effects from FDI to domestic firms (not necessarily agribusiness-based), through several channels. Vertical linkages are one transmission channel as foreign investors both compel and equip (using technical assistance) their suppliers to upgrade their product quality and processes; another is through horizontal spillovers, e.g. imitation. He finds that FDI impacts are only weakly attributed to horizontal spillovers; the more important source are vertical spillovers. Moreover the ability of domestic firms to benefit from these linkages varies, depending on their initial level of technology, and access to skilled labor. The importance of vertical spillovers has also been higlighted by Alvarez and Lopez (2008), though the source of innovation in his study are not TNCs *per se* but rather exporters.

## 6. CONCLUSION

Globalization in agriculture has witnessed the increasing participation of developing countries in world agro-trade. Concerns have been raised owing to high levels of concentration and increasing consolidation of agro-industry trade in recent decades. This is most evident in developed countries; it should be no surprise to observe similar patterns and trends in developing countries. This paper reviews the relevant literature to characterize and explain the structure of agro-trade in developing countries, and draw implications on the distribution of trade benefits.

Our review finds that, while the related literature is extensive, little systematic evidence is available to offer a comprehensive portrait of agro-trade of developing countries. Evidence for impacts of horizontal and vertical structure is *a fortiori* even patchier. Nevertheless we are able to draw some tentative conclusions, which serves as basis for some hypotheses for further research to be presented below.

Among the stages of the global value chain, it appears the dominance of large-scale operations is more pronounced in the downstream stages, compared to primary stages. Horizontal concentration arises from economies of scale together with entry barriers. These factors are becoming more important worldwide, including in developing countries, owing to supply drivers, demand drivers, policies, and institutional changes.

There is some evidence for significant market power being exercised among the more concentrated value chains, and that market concentration can also be leveraged via vertical coordination to widen the scope of market power. Nevertheless concentration is not sufficient to establish market power. There is mixed evidence suggesting that concentration and coordination promote better technologies and innovation. At the farm level, the evidence implies that that human capital, farm management practices, and other assets such as equipment and irrigation facilities would tend to differentiate participants from non-participants in the value chain; smallholders are not *per se* excluded from participation.

Further research may be structured around the following set of hypotheses:

- Global agro-trade is being increasingly driven by discriminating preferences of middle- to high-income consumers both in developed and developing countries, together with the need to coordinate across far-flung global supply chains.
- The heightened need for coordinated production and transaction flows are a major determinant of agro-trade consolidation both in terms of horizontal concentration and vertical coordination.
- Nevertheless, for selected countries and products (e.g. key staples and export crops), policy distortions continue to perpetuate monopolistic market structures.
- Where coordination economies drive the agro-trade structure, benefits of trade would tend to be skewed towards participants in the chain exhibiting greater capacity to comply with externally-driven performance standards.[6]

Future research should be directed towards compiling market concentration measures, describing vertical coordination mechanisms, at various stages of the value chain for widely traded products produced and imported by developing countries. A worthwhile research thrust would be to provide an in-depth analysis of the underlying causes of market consolidation and vertical coordination. Entry barriers should be identified and described in terms of technology, branding, policy (i.e. regulations, subsidies, guarantees), sunk costs, and other factors. Likewise, the factors underlying vertical integration or other coordination mechanisms should be elaborated.

Another fertile ground for research is determining the effects of market consolidation, both horizontally and vertically, as well as across borders, in terms of efficiency, equity of distribution of benefits from trade, and participation of smallholders and SMEs in the global value chain. One basis for determining distribution of benefits is market power, a feature that needs to be empirically verified, rather than automatically inferred from high market concentration. Ideally the measurement of market power should be based on price-cost information. In the absence of detailed information about net margins, other means of inferring market power (such as patterns and trends in price spreads) should be explored. The relationship between market power and benefit incidence should as much as possible be related to entry barriers that give rise to market concentration, as well as exclusion of small producers from the value chain. Such information and analysis could perhaps pave way towards design of policies towards more equitable and yet productive and efficient global value chains.

[6] On the other hand, where policies are the main determinants of market consolidation, it can be surmised that benefits of trade flow in line with political connections.

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