SHIFTING END MARKETS AND UPGRADING PROSPECTS IN GLOBAL VALUE CHAINS

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Editorial

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1 Introduction

This special issue aims to contribute to our understanding of developing countries' prospects for upgrading in global value chains (GVCs) in the context of recent shifts in global demand and production. Trade integration and economic growth in many developing countries has been fuelled by the insertion of local producers in GVCs feeding into high-income markets, in particular North America, Europe and Japan. However, since the mid-1980s – a trend that has been accelerated by the 2008/2009 global economic crisis – demand has stagnated in the historically dominant Northern countries and shifted to Southern countries, in particular to large emerging countries such as China, India, Brazil, South Africa, Russia and to the Middle East. Increasingly, the largest markets are in developing countries. At the same time, on the production side there has been a trend towards consolidation. While in the 1980s and 1990s an increasing number of developing country suppliers participated in GVCs geared towards Northern markets, typically by producing intermediate inputs or performing final assembly, in the last decade, a process of consolidation has been underway across a large spectrum of sectors with fewer firms and countries performing a wider range of tasks in GVCs.

Since the 2008/2009 trade collapse, developing countries have been the main engine of the world economic recovery. Traditional Northern end markets continue to absorb most of the developing countries' exports, but the prospects for South-South trade are brighter. Given the high level of deficits and debt, it is expected that demand will continue to stagnate in high-income countries. The consolidation process has also made it more difficult for developing country suppliers to enter and upgrade within GVCs oriented to high-income markets. In this context, developing country markets have received increasing attention. In the case of large emerging economies, including China, India and Brazil, this has translated into a greater focus on domestic markets. For smaller economies, it has meant a focus on exporting to regional or large emerging markets in the South. Hence, the shift in the geography of global production that started in the 1970s is now followed by a shift in the geography of global demand and consumption.

The main focus of this special issue is to assess the implications of these changes affecting global demand and production for GVCs and upgrading prospects for developing countries. In particular, it attempts to address the following questions:

- To what extend are the shifts in demand/end markets from the North to the South and the consolidation of global production observable in different commodity, manufacturing and service GVCs?
- What are the implications of these changes affecting global demand and production for upgrading or downgrading prospects in GVCs and for meeting development goals in low-income countries?
- Which policies are required to increase economic and social gains of participation in these GVCs?

The nine papers of this special issue present emerging evidence from different sectors and countries/regions on these questions. The first two papers assess the shifting end market trend where it has been most obvious: primary commodity value chains. The following papers focus on other sectors where demand has also shifted with crucial

implications for GVCs and upgrading processes. Two papers with different regional foci cover the apparel sector; two papers focus on different market segments of the electronics sector; one paper assesses the automotive sector; and one deals with offshore services. The last paper assesses the global football industry and interactions between upgrading and social compliance. This kind of cross-industry perspective is crucial to understand industry specificities and differences in upgrading or downgrading patterns across industries.

Despite important sector and country differences that are discussed in the papers, this Introduction attempts to identify some general trends. It first provides a short overview of the debate on upgrading in GVCs, then turns to the emerging issue of shifting end markets and explores how it fits with the upgrading debate. It ends with an overview of the papers included in the special issue.

2 Upgrading in GVCs

The global economy has been characterised by a rapid expansion of offshore production since at least the 1970s. Initially, offshore production was carried out by subsidiaries of multinational corporations, but soon local suppliers in a wide range of developing economies began to take over more of the responsibilities associated with export production, following the specifications laid out by global manufacturers, retailers, and brand marketers based in developed countries. The process by which developing countries' suppliers have moved up the value chain from merely assembling export items using imported inputs, to purchasing or producing all the required inputs and providing all production services, finishing, and packaging for delivery to retail outlets in end markets is broadly referred to as GVC upgrading [see Gereffi (1999) and Humphrey and Schmitz (2002) among others, for more detailed definitions].

Until the 1990s, upgrading had been discussed in the context of industrial development strategies based on import substitution or export orientation (Fold and Larsen, 2008). With the emergence of global production in many sectors and the increasing dominance of export-oriented development strategies, upgrading has been increasingly linked to GVCs (Kaplinsky and Morris, 2001). In its initial formulation, upgrading described development trajectories of export-oriented countries and regions and was linked to the participation in producer-driven or buyer-driven commodity chains, such as automobiles or apparel, respectively. Upgrading possibilities were different in each type of chain because the core competencies of the lead firms varied (Gereffi, 1994, 1999; Bair and Gereffi, 2001). A more differentiated typology of GVC governance structures argued that developing country suppliers actually participate in a broader range of industrial settings, including the extremes of competitive markets and vertically integrated 'hierarchies', and several types of network structures: captive, relational and modular (Gereffi et al., 2005).

With this new governance typology, the focus shifted from the country or region towards the firm level. Humphrey and Schmitz (2002) proposed an influential fourfold upgrading classification:

1 functional upgrading whereby an improvement in the position of firms would result from increasing the range of functions performed and moving from lower-value

activities with high competition (e.g., manufacturing) into higher-rent activities (e.g., design, branding, marketing, and logistics)

2 process upgrading which yields efficiency gains by re-organising the production system or introducing new technologies

3 product upgrading with higher unit value prices as products become more sophisticated

4 inter-chain upgrading with capabilities that were acquired in one chain leading to competitive benefits in another.

Upgrading opportunities are shaped by the type of value chain in which developing country suppliers are inserted, and in particular by the governance structure of chains. Governance structures determine the power relationships among the different actors involved in the chain and the flows and allocation of resources within chains. These structures are crucially influenced by lead firms – i.e., the firms that coordinate and govern GVCs. Lead firm governance strategies can both enable and constrain upgrading prospects of suppliers. Despite important sector, country and firm differences, lead firms are generally more supportive in process and product upgrading that leads to more efficient and higher quality production in their value chains. Functional upgrading is, however, only supported as long as it does not encroach on the core competencies of lead firms, which are activities with high returns and entry barriers such as design, branding and marketing. In particular, buyer-driven value chains have been widely seen to involve forms of governance that keep developing country suppliers out of these high-return activities (Kaplinsky, 2005). Low entry barriers and high competition in widely dispersed low value activities such as manufacturing have forced world market prices down and resulted in declining rewards even as exports as well as capabilities of suppliers have risen, leading to what has been called ‘immiserising growth’ (Kaplinsky, 2005).

However, upgrading patterns have become more complex in recent years, as illustrated by the diffusion of knowledge-intensive activities, including research and development (R&D) and innovation, particularly in Asia. In several sectors, such as automotive, electronics, and apparel, large first-tier suppliers have emerged that bundle diverse activities in GVCs, manage complex global production and sourcing networks, and play influential roles in logistics, financing, design and product development. Lead firms have also emerged in some developing countries that not only sell their products/services domestically, but increasingly on regional and global markets. The growing importance of developing country markets, including domestic, regional and large emerging markets, has supported this trend. However, there are important asymmetries between and within developing countries in firm and state capacity to capture these upgrading possibilities.

Upgrading efforts have also become more complex by taking into account the social dimensions of upgrading. The upgrading debate has largely focused on economic upgrading and has not specifically taken into account social upgrading understood as improved working conditions, higher-skilled and better paid jobs. Economic and social dimensions of upgrading are often intertwined, but one does not necessarily lead to the other. In fact, we understand relatively little about the conditions under which they occur together.

3 End markets and upgrading

While governance structures and the role of lead firms have received most attention in the upgrading debate, the role of (different) end markets is generally not explicitly discussed. Usually, the common assumption is that high-income countries are the target markets which becomes increasingly problematic in the context of shifting end markets to lower-income countries. End markets have important implications for the dynamics of GVCs and the upgrading prospects of firms and economies. Demand factors decisively shape upgrading possibilities not only by determining the size and the growth of markets, but also by the nature of demand that is distinct in lower-income countries compared to traditional (high-income countries) end markets. Demand in high-income countries has become increasingly sophisticated, including high expectations with regard to quality levels, product differentiation, rate of innovation, and high standards with regard to products and processes (Kaplinsky, 2010). In contrast, demand in lower-income countries is generally for less sophisticated products with regard to quality, variety, fashion/innovation content and frequency of deliveries, and process and product standards tend to receive less attention. However, price competition tends to be fiercer. Further, commodities (agricultural products for food and minerals, metals and energy to build up infrastructure) and basic manufactures such as apparel, low tech electronics and simple automotive models account for a higher share in the demand profile of lower-income countries as compared to high-income countries.

These different characteristics of demand have implications for entry and upgrading prospects in GVCs. With regard to entry, the development outcome might be positive. The sophisticated demand requirements in high-income countries have increased entry barriers, furthering consolidation in GVCs and the emergence of large global first-tier suppliers that can fulfil these requirements. Despite the efforts of development practitioners to build capacities, a number of less developed countries and smaller firms have been unable to meet the strict requirements of high-income markets and have been progressively excluded from GVCs. Entry barriers in GVCs feeding into lower-income countries tend to be lower and the shift in demand to the South has resulted in new opportunities for exports of cheaper, less sophisticated and lower quality products.

With regard to upgrading, evidence is mixed. On the one hand, upgrading prospects might be negatively affected by the lesser importance attributed to process and product standards in developing country end markets. With respect to functional upgrading, there may be constraints in particular for moving to processing activities in commodity GVCs. Low-income end markets with an economic structure comparable to that of their suppliers will primarily purchase unprocessed commodities, limiting opportunities for the supplier to develop processing activities and increase its value added. On the other hand, the less sophisticated nature of demand could help suppliers develop higher-return activities such as product development and design, branding and marketing that are tailored to their new customers' needs. Developing country firms may have an advantage in designing and making products for lower-income markets as they have a better understanding of these markets and as consumers tend to prefer 'good enough' quality at a reasonable price rather than cutting-edge technology for a premium. What used to be 'not enough' for high-income country lead firms could be 'just enough' for developing country markets. However, first evidence suggests that such functional upgrading seems to be more relevant in domestic or regional markets where suppliers have knowledge of the market and can adapt to its specificities.

Developed country firms have also changed their approach towards serving developing country markets. Instead of modifying and selling at lower prices to developing countries products that had been developed for consumers in the North, multinational companies have started to transfer innovation centres to large emerging countries and develop products tailored to local demand. This process of 'reverse innovation' has become the core business strategy of multinational companies like General Electric, and a major driver of South-South trade (Immelt et al., 2009). It also offers perspectives for increased exports to the North since the demand for 'good enough' products grew in rich countries in the context of the global economic crisis. For example, the Renault Logan, initially developed for emerging economies only, has been introduced on the French market in response to a pressing demand for simple, practical and cheap cars. This shift in multinational companies' business innovation strategy has major implications for upgrading in developing countries as these investments are often accompanied by substantial transfers of knowledge, but they also challenge the competitive advantage of developing country firms in supplying local and regional markets. First evidence suggests that only a few countries with sufficiently large domestic markets, such as China, India and Brazil, have benefited so far from this delocalisation of innovation and other high value-added activities.

Hence, shifting end markets offer opportunities and challenges for developing country suppliers. It will be important to understand these new end market dynamics, respond to them and build up capabilities necessary to enter and upgrade in GVCs oriented to these new markets. Up to now, however, policies of governments, donors, and multilateral organisations, as well as firms, have largely focused on export orientation towards traditional high income markets. These policies will need to be broadened to take into account the specific opportunities and challenges in lower-income export markets, regional markets, and domestic markets. This could prove difficult: For example, a large share of the trade technical assistance and capacity building efforts have been aimed at adapting and raising the standards of production in developing countries with a view to meet the standards imposed in high-income markets. With a shift in demand, the return on such investments would be lower and could even distract developing country producers from important markets in the South. Multinational corporations seem to have reacted faster than governments and donors by adjusting their production to the emerging markets' consumers needs. The papers of this Special Issue aim to provide some understanding and related policy conclusions on these questions.

4 Overview of the papers

The following section provides an overview of the nine papers of this special issue, with a focus on the main dynamics in the sectoral value chains, the implications of shifting end markets and how these trends affect development outcomes.

The first two papers assess end market and upgrading dynamics in commodity GVCs. Raphael Kaplinsky and Masuma Farooki set the stage by discussing longer-term shifts in global demand that have accelerated during the recent global economic crisis. They show that from the mid-1980s the Northern dominance in global demand began to wane, driven by two sets of inter-related developments: first, the very rapid growth of productive capabilities in the two large Asian Driver economies, China and India; and second, the

maturation of structural weaknesses in many of the previously dominant Northern economies that resulted in a global economic crisis in 2008/2009. If these two trends are prolonged (which the authors see as likely), the outcome will be sustained growth and demand in China, India and other low-income countries, and stagnation in the historically dominant Northern economies. This change in the drivers of global demand will have major impacts on the location of production and consumption in the global economy in the 21st century, with crucial implications for the capabilities accumulated by low-income producers feeding into GVCs. Supporting evidence for these trends is provided by the timber sector in Gabon, the cassava sector in Thailand, and the palm oil sector in Malaysia. Given the nature of demand in low-income countries, shifts in markets from the North to the South will likely lead to sustained demand for commodities, lower levels of processing and value added in low-income producing countries, and a reduced significance of standards and sophisticated demand preferences for exports to these developing economies.

How do these trends affect development objectives in low-income countries? The outcomes are uncertain, and depend on specific sector and country contexts and policy responses. On the positive side, enhanced demand from Southern economies will provide significant export opportunities; it will involve more labour-intensive process and product technologies; and it will offer lower entry barriers since demand will be less sophisticated and standards less significant. In particular, the latter may make it possible for lower-income countries and small- and medium-sized enterprises to enter GVCs. On the negative side, however, achieving higher standards can contribute to upgrading and to the development of capabilities; declining value added and processing along the chain can lead producers to be trapped in pockets of static comparative advantage and undermine developing countries' move into higher value added activities.

Niels Fold and Marianne Nylandsted Larsen present the main dynamics and implications of shifting end markets in the global agro-industrial value chains for 'tropical' crops – both traditional export crops (coffee, cocoa, and tea) and 'new' crops (fresh fruit), with a focus on upgrading opportunities for smallholder production in Africa. The authors identify two dominant trends: first, the simultaneous emergence of an intensified rivalry and cooperative strategies among lead firms in different nodes of the chains; and second, new requirements on retailer-driven markets in the North and the expansion of new markets in the South. The former markets have numerous standards for high-quality, high-priced products combined with the development of new niche markets for ethically concerned consumers, while the latter markets are primarily characterised by insignificant or non-existent standards for quality and food safety.

Turning to the development dimension of these trends, the authors conclude that prospects for African smallholder upgrading via retailer-driven strands of GVCs are steadily decreasing due to stricter requirements for supplier compliance with food safety and quality standards. This results in a constant pressure upstream for increased monitoring and control over production, economies of scale and willingness to take up more low-profit functions outsourced from lead firms. Thus, entry barriers for smallholders are high except for the relatively few smallholders who supply 'ethical' products to concerned consumers in the North. In this context, the paper stresses the need to re-think the policy fixation on exports to Northern markets. It suggests building up national institutions with the ability to stimulate smallholder incorporation and to foster volume upgrading linked to expanding and less demanding markets in the South and emerging economies in the North. These markets not only offer outlets for lower quality

goods, but also potentially function as 'training grounds' for the upgrading of both smallholder production and supportive national institutions.

The following two papers assess end market and upgrading dynamics in apparel GVCs. Stacey Frederick and Gary Gereffi assess upgrading trajectories of leading apparel exporters as they adapt to two shocks that have intensified international competition in this sector: the end of the Multi-Fibre Arrangement (MFA) quota system for textiles and apparel in 2005; and the global economic recession of 2008/2009. These events have been coupled with the consolidation of the global supply base in several large Asian economies, and a reconfiguration of global supply chains whereby leading apparel suppliers have strengthened their market share in the industry. On the country side, China has been the big winner and other Asian suppliers including Bangladesh, Indonesia, India and Vietnam continue to expand their roles in the industry. US regional apparel suppliers, most notably Mexico and Central America, have fared quite poorly in response to the MFA phase out and the global economic crisis. Among the factors favouring China compared to its Latin American competitors is a much greater diversification of its export markets. Whereas Mexico and Central America are almost exclusively reliant on the US market for apparel sales, due in part to regional trade agreements that have provided them with preferential market access, China has an exceptionally high level of export diversification, with just over half (53%) of its apparel exports going to the US and EU-15 markets. In general, the leading Asian apparel exporters tend to be far more diversified than there Latin American counterparts, which has allowed them to spread the risk from an over-reliance on slumping US or EU-15 markets. In addition, some of the larger, more advanced apparel suppliers such as China, India and Turkey are also reorienting production from export markets to large domestic and nearby regional markets.

The broader lesson of the Asia and Latin America comparison for development outcomes in the apparel GVC is the need for functional upgrading beyond assembly to various levels of 'full-package' production in the major apparel exporting economies. The desire of global buyers to reduce the complexity of their supply chains, keep costs down and be responsive to fluctuating consumer demand has spurred the shift from cut, make and trim (CMT) assembly operations to full-package production (also known as original equipment manufacturing or OEM) in all leading apparel exporting countries. To move into full-package supply, a strong textile connection is essential, and institutional support is often required to facilitate these backward linkages. A key policy implication in the Latin American context is that the rules of origin in US regional trade agreements for North America and Central America that favour procurement from US textile firms have tended to impede the development of local textile capabilities in the least developed countries in the region, leading to truncated upgrading efforts.

Mike Morris, Cornelia Staritz and Justin Barnes focus on shifting end markets in the apparel sector in Sub-Saharan Africa (SSA) and assess the implications for upgrading of integration into two distinct global apparel value chains in Lesotho and Swaziland. The first is the value chain characterised by Taiwanese investment that was motivated by MFA quota hopping and preferential market access through the African Growth and Opportunity Act (AGOA) and feeds into the US market by supplying long run, basics products to large US retailers. The second is the value chain characterised by South African investment and feeding into the South African market. While several Taiwanese investors left in the context of the MFA phase-out and the global economic

crisis, South African manufacturers entered and a new apparel value chain operating under very different dynamics than the US retailer-driven value chain has emerged.

Differences with respect to ownership patterns, end markets, governance structures, retail demand, and investor motivations and perceptions of main challenges have a major impact on upgrading possibilities. From the perspective of upgrading and sustainability, ownership patterns, local embeddedness and market diversification matter. The emergence of South Africa as an alternative end market and the different value chain dynamics operating in the South African retailer-governed value chain open up new opportunities from those of the AGOA/Taiwanese-dominated value chains. Whether the South African firms actually take advantage of the possibility offered by this value chain is the challenge facing the Lesotho and Swaziland industries and governments. Only so much local upgrading and capability and skill developments are likely to emanate from the dynamics driving the South African-based value chain. Fundamentally, the upgrading and innovation challenge is one of appropriately directed and capacitated industrial policy, with the dual aim of expanding the base of the skilled labour and management pool, and fostering a culture to raise the operational competitive levels of their manufacturing operations.

The next two papers assess end market and upgrading dynamics in electronics GVCs. Timothy J. Sturgeon and Momoko Kawakami assess recent trends in the global electronic hardware industry and their implications for upgrading opportunities for firms from developing countries. The authors present company, cluster, and country case studies to illustrate how supplier capabilities have developed in the context of electronics GVCs, and they identify persistent limits to upgrading experienced by even the most successful firms in the developing world. Four models used by developing country firms to overcome these limitations are presented:

1 global expansion though acquisition of declining brands (emerging multinationals)

2 separation of branded product divisions from contract manufacturing [original design manufacturing (ODM) spin-offs]

3 successful mixing of contract manufacturing and branded products (platform brands) for contractors with customers not in the electronic hardware business

4 the founding of factory-less product firms that rely on GVCs for a range of inputs, including production (emerging factory-less start-ups).

Each of these new models has been enabled, to a greater or lesser degree, by the rise of new markets and new kinds of consumers in developing countries.

Loren Brandt and Eric Thun examine how a shift in the end point of GVCs alters the prospects for industrial upgrading in a developing economy through an analysis of the mobile telecom sector in China. China is both the largest producer and the largest consumer of mobile handsets in the world. China's role as the 'world's factory' is well known and mobile handsets are no exception. What has changed over the last decade is the scale of consumption. China has become the world's largest market for mobile phones. The paper analyses the extent to which the rise of the Chinese domestic market for handsets has furthered the development efforts of indigenous Chinese firms. The relative market share of domestic and foreign mobile handset firms has fluctuated widely over the last decade. These changes are explained through an analysis of two primary variables: the evolution of technology in the sector and the evolution of market demand.

When firms from developing countries integrate in GVCs oriented to high-income countries, they face both a technology and a marketing gap. When the end point of these value chains shifts to their home markets, not only do their shortcomings lessen, the foreign firms that they compete with begin to face technology and marketing gaps of their own. Thus, domestic firms have been able to take advantage of both increasing modularity (to outsource components that they lacked the technology to produce) and their superior knowledge of low-end market segments to expand sales vis-à-vis foreign firms. But these advantages are temporary: high levels of modularity lead to intense competition and low profits among domestic firms, and foreign firms rapidly improve their market knowledge. The core challenge for domestic firms is translating temporary advantages over foreign competitors into investment in design capabilities and a shift away from purely modular relationships that provide a sustainable source of competitive advantage. State policy, particularly in how it shapes end markets, plays a critical role in supporting these efforts.

Timothy J. Sturgeon and Johannes Van Biesebroeck assess recent trends in automotive GVCs, analysing the role of developing countries in global production and consumption. The authors focus on how the recent global economic crisis has accelerated pre-crisis trends towards greater importance of the industry in the developing world. More rapid growth of car ownership is the impetus, but the co-location and close interaction of suppliers and lead firms in this industry, along with political pressure for local content and vehicle development, are important catalysts. Opportunities to move up in the value chain for suppliers in emerging economies have proliferated and are likely to become even stronger now that an increasing number of new models are developed specifically for markets in developing countries. The regional structure of production in the industry has largely confined the impact of the crisis within each major producing country/region.

While it appears that some large developing countries, especially China and India, are gradually gaining more independence and autonomy as their automotive industries and markets gain size and importance, and vehicles are designed locally to fit domestic customer requirements, supplier countries such as Mexico and countries in East Europe remain as dependent appendages of adjacent regional production systems. Case studies on China, India and Mexico provide an overview of different roles that developing country suppliers have in automotive GVCs, and the development paths and role of domestic firms. These three countries have relied to varying degrees on foreign direct investment by lead firms from mature economies to jump-start their industries. Two features of the Chinese industry position that country best for future development:

1 the leveraging of a well-developed supply base both locally in Shanghai, and abroad
2 a domestic market that is sufficiently large to spur the development of vehicles tailored to local tastes.

Karina Fernandez-Stark, Penny Bamber and Gary Gereffi analyse offshore services GVCs and show how developing nations have been able to seize growth opportunities in this dynamic industry. Offshore services are extremely varied, and existing typologies have highlighted the categories of information technology outsourcing (ITO), business process outsourcing (BPO), and knowledge process outsourcing (KPO). From a GVC perspective, however, upgrading occurs both within and between these categories of offshore services, which provide developing countries with multiple entry points into the

industry. While developed countries consume the vast majority of global services, demand from developing economies is beginning to grow. India, which in 2009 had 45% of the global market share for offshore services, has itself begun to focus on higher-value activities, as new low-income countries are joining the industry at multiple points in the chain. Indian firms have expanded in the South to serve both domestic and export markets. Some of the larger, non-Indian firms in the South have been able to leverage comparative advantages of price, time zones and expertise to provide services at the regional level, a new offshore services market that is expanding rapidly. In order to capture the gains of this evolving market, many developing countries are pursuing new policies of workforce development to encourage upgrading. Although the quality and quantity of human capital remains the key factor in the location of offshore services, formal education is being supplemented by demand-driven training. In addition, compliance with required international professional certifications and performance standards underlies the upgrading trajectories of developing countries within the ITO, BPO and KPO segments of the offshore services value chain.

The last paper by Khalid Nadvi assesses the GVC of the football manufacturing industry and interactions between technological upgrading and labour standard compliance. Football is the most popular global sport and the manufacturing of footballs is a billion dollar industry heavily dominated by major global brands. Over the past fifteen years there have been significant changes in the geographies of production and demand. China has consolidated its position as the world's largest football manufacturer, taking market share from Pakistan, the world's second biggest producer. On the end market side, newly emerging markets have appeared but the EU and the US have remained dominant. Also, the nature of the GVC has changed which can be seen in consolidation at the supplier firm level in China as well as Pakistan. These shifts have been triggered by interactions between labour standard compliance and technological upgrading. Social compliance efforts have altered the nature of production, with the leading brands no longer willing to source from suppliers who sub-contract production to home-based locations. Thus, in Pakistan more regulated forms of labour organisation have emerged in designated stitching centres and in large integrated factories. Similarly, in China supplier consolidation by the leading brands has meant the growing role of large producers. In addition to labour standard compliance, the football sector has seen important forms of upgrading in terms of product development and the use of new process technologies that have also affected the geography and nature of production.

What are the implications of these developments for Pakistani producers? The Pakistani football industry has largely managed to confront the substantial challenge it faced on labour standard compliance, particularly child labour during the mid 1990s. However, social compliance is a necessary, but not sufficient, condition to continue to compete in the global football industry and supply the major global brands. In terms of technological upgrading, the Pakistani industry has seen little evidence of new product development or shifts from hand stitching to mechanised forms of production. Pakistani producers continue to hold a niche for high quality, premium hand-stitched production, but at the same time improvements in machine stitching, developments in the production of aerodynamic thermo-moulded footballs, and the presence of high quality hand stitching in China has meant that Pakistan's market niche is being eroded. To respond to this the Pakistani industry needs to upgrade, which requires technological effort at the level of individual firms and for the industry cluster as a whole.

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What are the implications for global value chains when the market shifts from the north to the south?

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Abstract: This paper charts the evolution of the financial and economic crisis in the global economy and argues that the likely outcome will be sustained growth in the two very large Asian driver economies of China and India and stagnation in the historically dominant northern economies. Given the nature of demand in low income southern economies, it is likely to be reflected in sustained demand for commodities. Based on an analysis of the interaction between the nature of market demand and production processes, this paper argues that the transition in markets from high-income northern to low-income southern consumers will have implications for producers in commodity value chains. In particular it will lead to the diminished importance of standards (often a conduit for capability-growth) and to a reduction in the degree of value added to commodities in exporting economies.

Keywords: China; India; financial crisis; cassava; tropical timber.

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1 Introduction

Until the early 19th century, China and India together accounted for more than 60% of the world's economic output (Maddison, 2007). Thereafter, a combination of declining output in China and India, and rapidly growing investment and productivity in Europe and North America led to a shift in the geography of global production. In 1969, the nadir point of their relative decline, China and India together contributed less than 7% of total output in the global economy, with Europe accounting for 26% and North America 25% (ibid).

After the late 1960s, the dominance of the global economy by predominantly 'northern' economies was marked by deepening globalisation. Producers in low income countries were drawn into the global economy through their participation in global value chains (GVCs). In an increasing number of sectors, leading northern firms focused on their core competences (where they could generate and appropriate rents), and outsourced non-core tasks. Where this involved the extensive use of labour and/or low-technology, this outsourcing was directed to developing economies. International trade was increasingly concentrated in intermediate products and in the assembly of these intermediate products into final products destined for global consumers. Where developing economies participated in this division of labour, the designs and brandings of products, as well as the capital goods used to produce them, were sourced from high income economies, and the global chains were overwhelmingly coordinated and governed by lead firms from high income economies. Hence, the evolution of a global division of labour where, as a general rule, high income economies specialised in technology – and capital intensive links in the chain, whilst low-income economies occupied the low-tech and labour-intensive links. In addition, as high income economies became increasingly preoccupied with environmental concerns, the more pollution – and energy-intensive activities in the chain were located in low income economies.

In the last two decades of the 20th century, a parallel process of expansion and globalisation unfolded in the financial sector. Control over this sector were deregulated at an increasing pace from the mid-1970s, initially in the USA and the UK, and then subsequently in other northern and then southern economies. This was accompanied (some would say, driven) by the rapid diffusion of new information and telecommunications technologies which vastly eased transactions in this sector, leading to an exponential growth in its size and in its share of global economic returns. Policy responses to emerging crises in the financial sector (such as the reduction in interest rates after the collapse of the dotcom bubble in the late 1990s) fuelled rather than constrained its pace of expansion. Imbalances developed in global consumption and savings, with

growing structural disequilibria developing between different regions, notably in the trade and financial sectors.

From the mid-1980s this historical trajectory of northern dominance began to wane, driven by two sets of inter-related developments. The first was the very rapid growth of productive capabilities in the two large Asian Driver economies, China and India (http://www.asiandrivers.open.ac.uk). The second was the maturation of structural weaknesses in many of the key previously dominant northern economies which resulted in a major financial meltdown in 2008, with an accompanying fall in global, and (especially in northern economies') output. If these two trends are sustained, this will have a major impact on the locale of production and consumption in the global economy in the 21st century.

In this paper we will consider some of the potential implications of this changing global geography of production for the capabilities accumulated by low income producers feeding into GVCs. Here, informed by emerging evidence from the timber sector in Gabon, the cassava sector in Thailand (Kaplinsky et al., 2011 forthcoming) as well as in Malaysia's palm oil sector, we will consider two sets of capabilities. The first are those arising out of the need of producers to meet increasingly-demanding standards in final markets. The second arises from the growth of capabilities as producers climb the value-added tree in the production and processing of commodities.

The discussion will proceed as follows. We begin at a relatively abstract historically-informed level in Section 2 by discussing the role which final markets play in the development of capabilities, paying particular attention to the growing prevalence of process and product standards in GVCs. We also discuss the role played by linkages in commodities value chains in fostering economic growth and diversification. In Section 3 we consider the significance of the current historical moment, observing the divergent growth paths in the post-financial crisis global economy, and concluding that there is a strong likelihood of sustained growth in the south and stagnation in the north. Section 4 addresses the distinctive nature of consumption in these rapidly-growing low income final markets. Section 5 draws the discussion in Sections 3 and 4 together, and speculates on the consequence which the switch in demand from slow-growing northern to rapidly-growing southern markets holds for capability-growth in southern-based commodity value chains and for the international division of labour in commodities sectors. These speculations are briefly supported by evidence drawn from two global commodity value chains – cassava and timber.

2 Markets, GVCs, standards and capabilities

In the context of a highly competitive global economy, growing and sustaining incomes over time require a combination of increasing investment (the extensive margin) and increasing productivity (the intensive margin). Much of our understanding of these two components of growth has been informed by the analysis of the determinants of supply. Predominantly this has focused on domestic factors, that is the nature and extent of funds available for investment and capability-building, the drivers of these investments in the corporate sector, the forms of state support provided to the productive sector and the role played by the national system of innovation. These issues, for example, have been intensively explored for Korea and Taiwan (Amsden, 1989; Wade, 1990). There has also been an accompanying, albeit less developed literature on the role played by

(predominantly foreign-based) lead-buyers in the development of capabilities in firms and countries feeding into GVCs. Buyer-driven chains have been widely seen to involve forms of governance which consign developing country producers in these chains to processes of physical transformation, locking them out of high-return links such as logistics, design, branding and marketing (Schmitz and Knorringa, 2000; Kaplinsky et al., 2002). To the best of our knowledge however, there has been little or no literature on the influence which patterns of demand in final markets – as opposed to the actions of lead-buyers – have played in the development and augmentation of productive capabilities in GVCs. It is this issue which is the subject of the analysis which follows.

A key demand-related factor affecting economic growth is the size and rate of market growth. Rapidly expanding and large markets both spur productivity growth by allowing for scale economies in production (Verdoorns Law) and send a signal to producers that they can have confidence in investing for the future. It leads to a virtuous circle of growth and innovation, and is particularly influential in the context of very large domestic markets, or when producers sell into global markets.

But, it is not just the *volume* and rate of demand growth which affects productivity and capabilities. The *nature* of demand also has a significant impact on capabilities, and the returns to alternative patterns of production.

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

A direct consequence of this search for low-cost flexibility was a transition in production organisation, from 'just-in-case' mass-production to 'just-in-time' lean production (Kaplinsky, 1994; Womack and Jones, 1996). A series of related changes in quality-procedures (with 'zero-defects' becoming an essential building block of just-in-time production) and reduced batch-size, coupled with the drive by firms to concentrate on their core competences meant that lead firms were required to take responsibility for the systemic efficiency of their increasingly GVCs (Gereffi, 1994). One important component of the tool-box which this entailed was the development of standards in production, often usefully summarised as QCD. The Q stood for standards over quality (increasingly measured in parts per million), the C for cost (annual reductions in price paid to suppliers) and D for delivery (more frequent deliveries in smaller batches) (Kaplinsky, 2010a).

Most of these standards were firm-specific. But in some cases industry-specific standards were also developed as the outcome of collaboration between private sector firms searching for competitive advantage. Increasingly, too, standards were introduced to foster the capabilities of suppliers to meet the new requirements of lean production, notably the cross-sectoral ISO9000 quality procedures, and subsequently ISO14000 environmental standards. The development and extension of these process standards began in the Japanese auto industry in the 1960s and then gradually spread to the global electronics sector and then more widely and rapidly to many sectors in subsequent

decades. By the end of the 20th century, these private sector standards had become an integral component in most GVCs feeding production into global markets, particularly for intermediate and final consumption goods characterised by variety.

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

The demand that producers meet standards in GVCs has contributed to the growth of capabilities of producers in a number of ways. First, at the level of the workforce, the need to measure and analyse process performance requires numeracy, literacy and other skills, leading to an upgrading of skills when compared to chains without process standards. This affected both the existing labour force in firms and in their need to recruit a relatively educated labour force. Second, the establishment of procedures to document process and product requires the development of routines within firms to regularise behaviour. Routines of this sort are widely recognised to be a key component of firm-level capabilities (Nelson and Winter, 1982) and the development of routines with regard to a particular form of certification frequently spilled-over into routines which led to the upgrading of performance in other areas as well. Third, since the achievement of standards generally requires conformance along the value chain, these individual capabilities and firm-level routines have been driven down the supply-chain in producing economies (Bessant et al., 2003). Fourth, the ability to meet a complex amalgam of standards, many of which require specialised knowledge-inputs, requires the development of complementary skills in the national system of innovation, that is, in specialised service providers, training institutions and government support-agencies (Lundvall, 1992). And, fifth, the standards agenda presents a moving frontier, both in relation to the types of standards involved (for example, the ISO9000 family of quality standards was followed by the ISO14000 family of environmental standards and now emerging ISO18000 standards on labour), and in the detail of individual standards. This has meant that producers striving to meet the standards-agenda have had to endogenise the capacity to change, that is, to develop dynamic capabilities (Teece et al., 1997).

Of course, the understanding of capability-growth must reflect both supply and demand factors. But it also will reflect the interaction between these two sets of factors. For example, responding to a series of analyses on the growth of supply capabilities in the newly-industrialising-economies, Feenstra and Hamilton point to the role played by the US retail sector in the evolving east Asian 'export miracle'. They show how the growing concentration of buying power in the USA during the 1960s led to intense competition to find low-cost high-volume sources of supply (Feenstra and Hamilton, 2005). This led Walmart and other large retail chains to actively foster the growth of supply capabilities in Hong Kong, Korea, Singapore and Taiwan during the 1970s and 1980s, a process extended to Chinese and other global suppliers in the 1980s and 1990s. This complemented steps taken by governments and producers in these NIEs to strengthen capabilities (Wade, 1990; Amsden, 1989).

In summary, therefore, although economic growth is ultimately a story of augmented supply capabilities, there has been growing recognition of the key role which the pattern

of demand in final markets play in inducing this growth in supply capabilities. Market size and market growth are one part of this story. But another part involves the nature of final markets, and the role which this plays in guiding the direction of capability growth amongst suppliers. Intermediation into final markets, and therefore the nature of buying power in global markets, is a further factor affecting economic growth, particularly in economies in which external trade plays a key role.

3 Economic crisis and the southern drivers of demand growth

The recession following the financial crisis of autumn 2008 sparked the largest fall in output in the north since WW2, with an associated decline in output and exports in many low income economies, including the stellar-growth economies in east and south Asia. Between the onset of the crisis and the first quarter of 2009, global output fell by 2.4%, and that in the OECD fell by 4% (Holland et al., 2009). Although there was a level of revival from late 2009, structural weaknesses in the global economy suggest a period of sustained economic slowdown, at least for some regions. What implications will these growth trajectories have for both the geography and character of global consumption?

We believe that the likely outcome will be that growth in the high-income northern countries will stagnate or be very muted, whereas by contrast, many low income economies – particularly large economies such as China, India and Brazil – will continue to growth very rapidly.

3.1 Structural crisis in the north

High rates of global economic growth during the 1990s and the first decade of the new century were essentially fuelled by high rates of consumption in key northern economies, particularly in the large economies of the USA, the UK and Spain, as well as in some smaller economies such as Ireland, Greece and Iceland. In each of these cases, this consumption boom was made possible through a series of financial bubbles, particularly in housing which allowed consumers to drawn on the 'wealth' arising from (unsustainably) inflating house prices. This resulted in two sets of related phenomena – falling rates of household and personal savings (in some cases falling into dis-savings) and a rise in balance of payments deficits. These deficits in external payments were filled by large payments' surpluses in key exporting economies, particularly China, Japan and Germany, made possible by restrained personal consumption arising from high rates of personal (and in recent years, corporate) savings and/or low rates of consumption.

Table 1 shows the extent of external payments deficits and surpluses in key large trading economies. The two most notable cases are the largest deficit economy, the USA (its payments deficit hovered around 5% of GDP) and China (whose payments surplus in 2008 was 11% of GDP). Also notable is the case of Spain (deficit of almost 10% of GDP in 2008) and the UK (a deficit almost 3% of GDP). Some of the other smaller OECD economies showed even greater trade deficits, notably Greece (15% of GDP) and Iceland (40% of GDP in 2008). A significant feature of this economic performance was the pattern of net savings across global economies, with relatively low rates of final household consumption expenditure in China and a high rate of private consumption (especially compared to low rate of savings) in three key bubble economies, Spain, the UK and the USA (Table 2). Concomitant with these imbalances has been the growth of

foreign exchange reserves in the two leading surplus economies (China and Japan), which together accounted for nearly half of total global foreign exchange reserves (Table 3).

Table 1 Country current account balance (percent of country GDP)

	Brazil	*India*	*China*	*Germany*	*Japan*	*Spain*	*UK*	*USA*
1985	–0.1	–1.8	–3.7	2.5	3.8	1.6	0.7	–3.0
1990	–0.8	–2.2	3.4	2.8	1.5	–3.5	–3.9	–1.4
2000	–3.8	–1.0	1.7	–1.7	2.6	–4.0	–2.7	–4.3
2005	1.6	–1.0	7.2	5.1	3.6	–7.4	–2.6	–5.9
2008	–1.7	–1.0	11.0	6.7	3.2	–9.6	–2.8	–4.7

Source: Calculated from OECD Database, http://stats.oecd.org

Table 2 Savings and household consumption expenditure (percent of country GDP)

	Gross domestic savings	*Household final consumption expenditure*	*Savings to consumption ratio*
Brazil			
1990	21	59	0.36
2000	16	64	0.26
2008	19	61	0.31
China			
1990	40	46	0.86
2000	38	47	0.80
2008	49	37	1.34
India			
1990	23	66	0.35
2000	23	64	0.36
2008	33	56	0.59
Germany			
1990	23	58	0.40
2000	22	59	0.38
2007	25	57	0.45
Japan			
1990	34	53	0.65
2000	27	56	0.48
2006	25	57	0.44
Spain			
1990	23	60	0.38
2000	23	60	0.39
2007	25	57	0.44

Source: Complied from World Development Indicators, http://data.worldbank.org

Table 2 Savings and household consumption expenditure (percent of country GDP) (continued)

	Gross domestic savings	*Household final consumption expenditure*	*Savings to consumption ratio*
UK			
1990	18	62	0.29
2000	16	65	0.25
2007	15	63	0.24
USA			
1990	16	67	0.24
2000	17	69	0.24
2006	14	70	0.20

Source: Complied from World Development Indicators, http://data.worldbank.org

Table 3 Foreign exchange reserves (US$ millions) 2009

	Country	*($ millions)*	*% of world total*
	World (sum of all countries)	*7,520,566*	
2009	China (including Hong Kong)	2,292,300	30%
2009	Japan	1,044,327	14%
2008	Eurozone (EU member states which have adopted the EURO, incl. ECB)	569,213	8%
2008	India	313,354	4%
2009	Brazil	223,713	3%
2008	Germany	150,377	2%
2008	UK	99,956	1%
2008	USA	67,000	1%

Source: The SWF Institute, http://www.swfinstitute.org

The imbalances in trade – feeding off the financial bubble – represents a core structural feature which is unsustainable in the medium and long term, particularly for very large global economies such as the USA and China. To be resolved they require a combination of changes in consumption and in production. With regard to consumption, this involves either (or a combination of) a reduction in consumption in the surplus economies, or a rise in consumption in the deficit economies, resulting in a fall in net exports in surplus economies and a rise in net exports in the deficit countries.

The fall in private consumption in deficit economies will in part reflect a decline in employment and hence in private consumption. Already, before the austerity budgets of 2009 and 2010 in Europe rolled out, and despite a series of 'quantitative easing' monetary expansions in the USA, falling consumption in most northern economies was both driven by, and acted to increase the growing rate of unemployment. Employment in the OECD fell by 2.2 m between the 2nd quarters of 2008 and 2009 (Holland et al., 2009), and unemployment grew to exceed 10% of the labour force in the USA in late 2009. At the same time, public-sector consumption has fallen in many economies.

Government fiscal debt rose very significantly in many northern economies, in part due to the need to bail-out the financial sector. Although this debt-burden was not as severe in historical perspective as many political actors made out (some of whom used the fiscal crisis as an opportunity to push for a smaller state), it nevertheless became a widespread perception that government expenditure in these northern economies had to be reduced. Whatever the economic logic of this response – and despite most of the economics profession calling for the maintenance of deficit financing and counter-cyclical fiscal policy during a period of crisis – in most of the northern economies, there was an increasing political momentum to restrain government expenditure.

Thus two clear trends have merged in major northern economies. First, personal consumption has fallen back and is unlikely to rise in the near-to-mid-term as households rebuild their savings and cut personal debt. Second, although continued government dis-saving in some countries has limited the fall in aggregate consumption and output, it is unsustainable in the medium and long-term, for fiscal reasons, because of sustained trade deficits and most importantly, due to rising political opposition.

In the context of declining private- and public-sector demand in northern economies, the high rates of global growth between 1998 and 2008 can only be maintained if there is an equivalent rise in imports from those economies in structural surplus, notably China, Japan and Germany. But this has proved difficult, and is likely to continue to prove difficult. Scarred by its history of inflation during the 1920s, Germany made it clear that it wished to minimise deficit financing. It also explicitly committed itself to remaining an economy with a substantial trade surplus. Despite efforts to reflate consumption in the past, Japan also experienced difficulty in reflating its domestic economy, and its industrial sector continued to be externally-focused. An IMF report concluded, "the scope for advanced economies such as Germany and Japan to contribute to rebalancing is limited, given their need to build savings to prepare for population ageing" [IMF, (2009), p.33]. So China, and to a lesser extent India and Brazil hold the key to the rising imports which the northern economies require in order to maintain output and employment and at the same time to rebalance their trade accounts.

The problem is that there is little realistic sign that China-led reflation will draw in the imports to allow the major deficit economies to resume past levels of consumption growth whilst at the same time rebalancing their external payments accounts. In 2009 the Chinese Government embarked on a major spending programme. But, much of this focused on infrastructure and on public services. Government spending expanded rapidly in health (38%), education (24%), and social safety (22%) (World Bank, 2009a). These infrastructural expenditures had derived import requirements but, as we will see below, these are unlikely to have a direct first-round impact on the exports of the USA and the EU.

Of course there are indirect trade mutlipliers operating in this expansion of domestically-oriented expenditure in China. But they are likely to be muted, at least insofar as they affect the demand for goods and services exported by high income northern economies. Moreover, employment-growth in China has been key in sustaining political stability in the face of rising inequality, and insofar as China's labour-intensive exports decline, the emphasis will necessarily be placed on promoting domestic production to meet rising consumer demand. [One-third of China's employment growth of around 8 m p.a. between 1997 and 2002 was contributed by growing exports, Feenstra and Hong (2009)]. Moreover, despite China's rapid economic growth and large size, it remains a small player in international trade. In 2008, total Chinese demand was

equivalent to less than one-quarter of total consumption in the USA and the EU. All of these factors also apply to India, but since its global footprint is smaller than that of China, its capacity to stimulate exports from the northern economies is even more limited.

From this we conclude that beyond the short term unsustainable deficit financing by governments in the large deficit economies and given the limits to import growth in China and India, the rebalancing by the northern economies will occur through a reduction in consumption, and hence in imports. We should not see this as an historical aberration. Rather, it was the post 1990s boom in consumption in the large deficit economies which was aberrant, arising from a series of financial bubbles and leading to growing consumption in the (high income) deficit economies being subsidised by high savings in some (low income) surplus economies (notably China and India). We can also anticipate that this fall in northern consumption will persist for some time, perhaps even as long as the 18 year post-bubble recession which the Japanese economy has experienced since 1991.

3.2 Sustained consumption in the south

China's recent growth, at least since the beginning of the 1980s, has been stellar, averaging more than 9% p.a over the period. India, too, has experienced very rapid and sustained growth, albeit only from the early 1990s. It is tempting to see these growth trajectories as exceptional, an 'economic miracle'. Yet neither of these two country's growth experiences is unique. If we chart the evolution of their growth paths – both in relation to output and exports – since the onset of their growth-inflection, and compare these with the similar experiences of Japan (after 1960) and Korea (after 1963), it is evident that other economies have experienced similar economic 'miracles' in the past (Kaplinsky and Messner, 2008). What is significant about the China-India experience is the size of these economies. Together, Japan and Korea never exceeded 5% of the global population. In 2008 China alone accounted for 20% of the global population and together with India, for almost 37% of the global total.

Three key relevant features stand out with regard to the recent growth experience of these two Asian Driver economies. The first is that their growth rates have been significantly greater than those of the key northern economies. China had already become the second largest economy in 2010, and if these past trajectories are sustained, then it is estimated that India will be the third largest by 2035 (Goldman Sachs, 2001). Of course, if past growth relativities are not sustained in the future (for example, if as suggested in Section 3.1 above the northern economies experience a protracted period of stagnation), then China and India's relative size will grow in a shorter time span than these projections of past performance suggest. Second, both China and India are in substantial trade surplus. They do not need to reduce or hold back consumption in the same way as do the large northern economies. And, third, by virtue of their large size, they have the capacity to grow and realise scale economies by expanding their very large domestic markets. An illustration of the size of these Asian Driver markets is provided by a recent analysis of the locus of consumption by the global consuming class ('the middle class'), defined as those consumers with annual incomes of between $10 and $100 per day in 2009 (in 2005 PPP $) (Kharas, 2009). Projecting forward to 2030 on the basis of growth rates in the past two decades, the centre of gravity of global consumption shifts decisively (Table 4). The share of Europe and USA falls from 64% in 2009 to 30% in 2030, whilst

that of the south in general and Asia in particular, rises. The share of Asia and the Pacific in the global consuming class is projected to increase from 23% in 2009 to 59% in 2030. Bear in mind, though, that these projections are based on past growth relativities. If northern economies stagnate and the Asian Drivers and the surrounding regional economy continue to grow (albeit at a reduced rate), the shift of global consumption power to Asia, and to low income economies in Asia, will be accentuated.

Table 4 Spending by the global middle (percent of global GDP in $PPP) (2009 to 2030)

	2009	*2030*
N. America	26	10
Europe	38	20
C. and S. America	7	6
Asia Pacific	23	59
SSA	1	1
M. East, N. Africa	4	4

Source: Selected from Table 3, Kharas (2009)

Nothing guarantees sustained growth in the Asian Driver economies. The fall in consumption in the northern deficit economies may be so large that it undermines export-oriented growth in China and India, with a potential combination of negative multiplier effects on economic activity and political disruption as unemployment grows. It may also be that environmental externalities grow so substantially, exacerbated by changing and unpredictable climate, that output growth is not sustainable. And it may be that global political instability spills over into the Asia-Pacific region, with a harmful impact on economic growth. So, as in the case of the analysis of growth paths in the northern economies (Section 3.1), there are clear uncertainties in projecting forward, particularly in the context of a disruptive global financial crisis. Nevertheless it is our judgement that just as growth is likely to be reduced or to stagnate in the northern economies in the future, so growth in Asia in general, and in China and India in particular, is likely to be sustained. If nothing else, the relativities in growth paths between these two worlds in the past two decades is likely to be sustained, and even to increase. If this is the case, then it is important to understand the nature of demand in these two large southern drivers of growth, an issue which we now consider.

4 Patterns of demand in southern drivers of growth

Despite differences in country-size and endowments, most economies have experienced a similar pattern of structural change in their growth trajectories (Kuznets, 1966; Chenery and Syrquin, 1975). Low income economies tend to be agrarian, with the primary sector dominating GDP. As incomes rise and manufacturing expands, the industrial sector takes over as the major driver of GDP growth. Continued income growth leads to higher demand for services, and at higher income levels the service sector becomes the dominant contributor to GDP. These structural shifts represent a well-established pattern, observed in a large number of countries over time. What interests us in this analysis is that in the context of China (and India) becoming the major driver(s) of global demand in the coming decades, what implications the structural shifts in these Asian Driver economies

have for low income country exporters in general, and for low income country exporters of commodities in particular? Here there are two major issues – the structure, and the nature of import demand – and in both cases we will consider them in relation to the evolution of the Chinese economy.

4.1 The sectoral structure of import demand

There are three major consequences of changing economic structures which affect the product composition of imports. First, at low per capita incomes, the income elasticity of demand for agricultural products in general (and food in particular) is relatively high. As incomes rise, the relative income elasticity of demand for manufactures grows, and as incomes increase further, the demand for services becomes increasingly important in final demand. Secondly, with the changing sectoral distribution of GDP, there is a shift in labour and employment across sectors. As the industrial sector expands, labour and employment migrate from agriculture in the rural areas to the manufacturing sector in the cities. Third, as economic output becomes more diversified, specialisation and interchange grows. Together with the growth of urbanisation, this requires heavy investments in infrastructure.

These three trends result in a growing demand for commodities (Farooki and Kaplinsky, 2011 forthcoming). 'Soft commodities' feed agricultural inputs into food, and provide intermediate inputs (such as cotton and timber) into manufacturing. The demand for 'hard commodities' (such as minerals and metals) and energy grows as a consequence of investments in infrastructure and the expansion of the manufacturing sector.

China's (and India's) growth-paths reflect each of these trends. Significantly, it reflects the experience of an economy at an early stage in the evolution of this growth-path. We can illustrate this by focusing on some of the key parameters of China's recent growth trajectory. China's economy has shown a rapid transition from agriculture to industry. The share of agriculture in GDP fell from 27% in 1990 to 11.3% in 2008. In the same period, the share of industry increased from 42% to 49% of GDP. This was accompanied by large scale rural-urban migration. In 2010, 47% of the population (635 m) lived in urban centres. By 2015 the urban population is projected to rise to 713 m, and to 906 m in 2030. Thus, by 2030 China's urban population will be equivalent to the combined urban population of the USA and Europe, and by 2050, to the total population of the USA and Western Europe.

This process of urbanisation is reflected in the growth in demand for infrastructure in general, and new infrastructure and housing in particular. It is one of the reasons leading observers to conclude that infrastructure-intensity is highest at the early stages of industrialisation and at relatively low levels of per capita income (Canning, 1999; Auty, 2008). New projects tend to be much more commodity intensive as compared to expansion and reconstruction investments (World Bank, 2009b). As Table 5 shows, the share of new projects in urban fixed investments in China increased from less than a third to almost a half between 1995 and 2007.

Second, the growth of China's manufacturing sector has also made intensive use of commodities, particularly hard commodities and energy. To a considerable extent this is reflected in the metals and minerals-intensity of China's rapidly-growing manufactured exports which comprised the bulk of exports between 1990 and 2006 (Figure 1). As a result of these combined factors, the elasticity of demand for energy and metals grew

rapidly between the 1990s and the 2000s, and for key resource inputs such as coal, pig iron, crude steel and rolled steel, comfortably exceed a value of one (Table 6).

Table 5 Percent share of total investment in fixed assets in urban areas by type of construction in China (1995–2007)

Year	*New construction*	*Expansion*	*Reconstruction*	*Maintenance and equipment*
1995	30	29	12	29
2000	32	24	15	29
2007	44	17	12	27

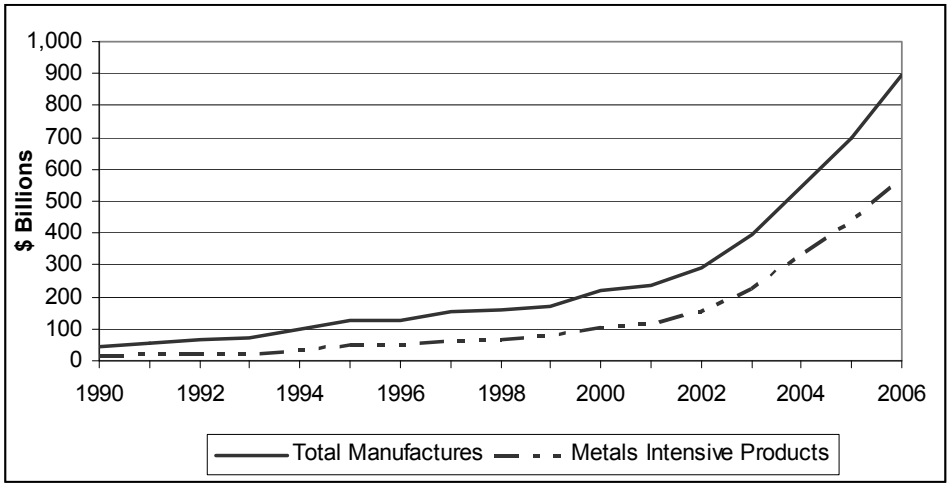
Source: Chinese Statistical Yearbook (2008)

Table 6 Elasticity's of energy consumption and metal production in China (1991–2005)

Period	*Coal*	*Crude oil*	*Pig iron*	*Crude steel*	*Rolled steel*
1991–1995	0.441	0.569	0.900	0.614	0.958
2001–2005	1.105	0.832	2.222	2.340	2.545

Source: Selected from Zhang and Zheng (2008)

Figure 1 China's metal and minerals intensive exports in total manufactures exports (1990–2006)

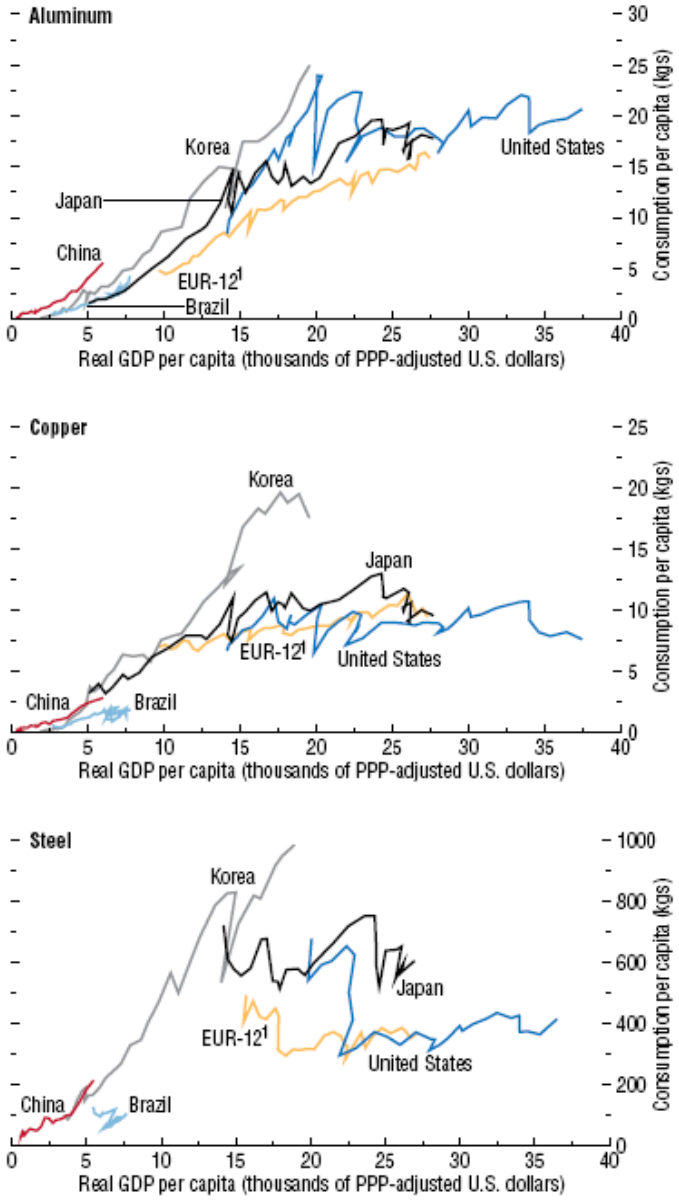


Source: Farooki (2009), from COMTRADE data accessed via WITS in November 2008. The listing of metals-intensive sectors is available in Farooki (2009, Annex 1)

With regard to agricultural inputs, a key component of demand at low per capita incomes is that for food products. Studies of urban consumers in China show that the income elasticity of demand for food falls from almost unity (0.96) at household incomes around Yuan 2,500 ($375) p.a., to 0.4 for household incomes of Yuan 7,500 ($1,125) and to 0.33 for household incomes of Yuan 10,000 ($1,500).[1] Thus, even though incomes are growing (and the income elasticity of demand for food is falling), there is considerable scope for sustained demand for food, particularly as in 2009, 56% of Chinese households had an annual income of less than $5,000 (Figure 3 below). Moreover, as incomes grow,

the demand for meat expands, and this makes intensive use of grain [approximately four kilos of grain are required to produce one kilo of meat (Conceicao and Mendoza, 2009)]. Thus food-availability is likely to be of considerable importance in the future in China, not least because whilst it has 20% of global population China possesses 7% of global arable land.

Figure 2 Per capita consumption of base metals (see online version for colours)



Source: IMF (2006)

What these data show is that China's growth path is particularly commodity-intensive. There is nothing exceptional in this resource intensive growth path. It closely reflects China's per capita income, which in 2009 was $6,500 compared to $46,000 for the USA (PPP$). But two factors are worthy of notice. First, as Figure 2 shows, there is some way to go in per capita income levels before the resource intensity of growth declines. Based on the historic resource intensity of demand for aluminium, copper and steel in Korea, Japan, the EU-12 and the USA, it seems unlikely that China's (and India's) demand for minerals and metals will decline in the foreseeable future, despite rapid economic growth and rising per capita incomes.

Second, both China and India (as we have seen) are very large economies. Thus, in analysing their impact on global trade we have to suspend the small country assumption that no single economy's trade pattern will shift the structure of global trade or the prices at which products are traded. As Table 7 shows, China accounts for a rapidly-growing share of global consumption of key base metals and meat, and this has led some commentators (including ourselves – Kaplinsky, 2006, 2009; Farooki, 2009) to conclude that at the least this helped explain the boom in commodity prices between 2001 and 2008, and perhaps may also play a historically-significant role in promoting a structural shift in the global commodities-manufactures terms of trade in favour of commodities.

Table 7 China's share of global consumption of base metals and meat

	1990	*2000*	*2007*
Base metals (% share of world demand)[1]			
Aluminium	5	13	33
Zinc	8	15	31
Lead	7	10	31
Iron ore	4	16	48
Copper	7	12	26
Food products (% share of world consumption)[2]			
Poultry	9	18	17
Pork	35	47	46
Beef	2	10	12
Soybeans			40

Source: [1]Macquarie Commodities Research (2008)
[2]Conceicao and Mendoza (2008)

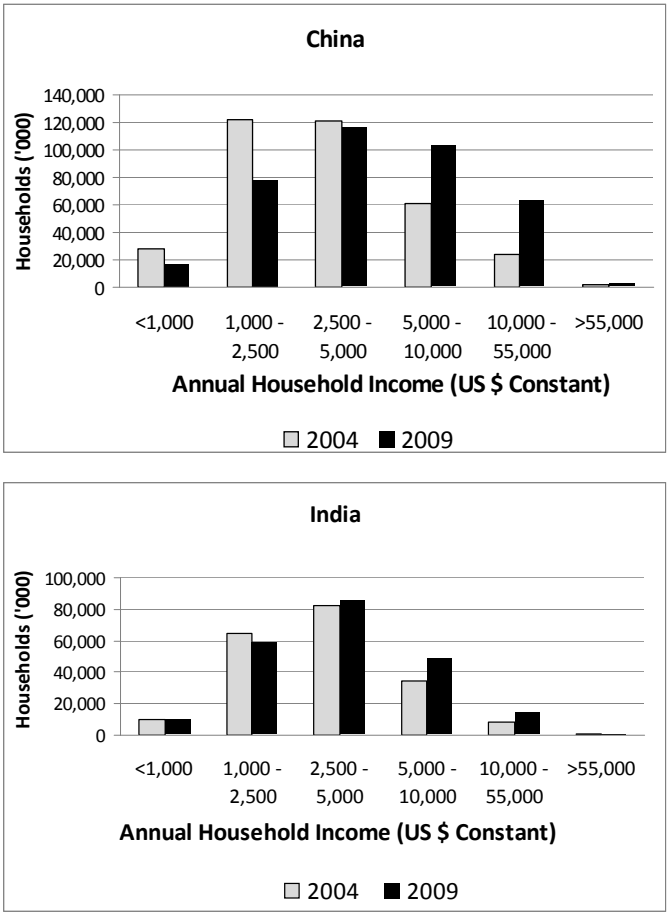
4.2 The nature of import demand

Thus, we have observed that Chinese growth has led to a sharp rise in its share of global demand for commodities and perhaps also for a structural upward shift in the relative global price of commodities. But there is more that we can observe about China's demand for commodities which is of relevance to global commodity value chains feeding into the Chinese economy. The key relevant factors are the demand-preferences of low income consumers, the consequent relative insignificance of standards in value chains, and the preference for the importation of relatively unprocessed products.

4.2.1 The demand preferences of low income consumers

In 2009, per capita income (PPP) in the USA was $46,000 followed by Japan at $32,500 and for Europe at $32,000. Notwithstanding the dispersion of incomes in high-income economies, the incomes involved are in almost all cases way beyond those earned in low income economies such as China. Figure 3 shows the dispersion of household incomes in China and India. From this it is evident that more than 210 m *households* (56%) in China and more than 155 m *households* (71%) in India had total annual incomes of less than $5,000.[2] By contrast, in the USA over 70% of the households and 60% in the UK had incomes over $35,000.

Figure 3 Number of households, by disposable income, China and India, 2004 and 2009



Source: Complied from http://www.portal.euromonitor.com (accessed on July 2010)

In many cases, these households lived above the minimum $1 per day MDG threshold, particularly in China. But the point of significance is that an increasing number of these households are cash consumers, that is, they buy-in a range of products, consumer, intermediate and capital goods. For these consumers, price is an overwhelming

consideration in consumption. That is not to say that they do not care about quality and variety (the two key drivers of consumer demand in northern economies in recent decades – see Section 2 above), but that these preferences play a minor role in their consumption choices. Product differentiation (variety and quality) gives way to product 'commodification' (standardisation in order to achieve low prices). To the best of our knowledge, this assertion is not evidenceable although the idea that low income markets provide scope for profitable production through the sale of low-value items is now widely acknowledged under the banner of the "fortune at the bottom of the pyramid" (Prahalad, 2005).

4.2.2 Imported-inputs are not standards-intensive

Following on from the preferences of low income consumers, there will be derived implications for the role which standards play in value chains. In Section 2 we distinguished between process and product. We observed that there was a growing tendency for the standards intensity in value chains to grow, reflecting a combination of factors – firm specific concerns with standards (such as Q-C-D) to meet consumer needs for product diversity and product quality, government-standards to protect consumers, and civil-society-induced standards reflecting growing concerns with the ethics of productions systems and their environmental impact. In the context of the dominance of (very) low consumer incomes in countries such as China and India, each of these drivers of standards is likely to be of very diminished significance. In general, firms are less concerned with product variety, so that the imperatives to achieve flexibility through just-in-time production (and hence Q-C-D standards) are weak. Low income country governments may either have poorly developed safety standards, or fail to implement them effectively. Recent cases in both China (baby milk) and India (pesticide in soft drinks) provide striking evidence of this[3]. Finally, the NGOs which have driven public opinion on issues such as FairTrade, labour standards and the environment are muted in low income countries and are likely to have little significance with regard to the incorporation of ethical and environmental standards in value chains. Indeed, particularly in China, NGOs often have a tenuous identity.

4.2.3 The growth in imports of relatively unprocessed products

A key objective of economic and industrial policy in most low income countries is to add value to natural resources: in South Africa, for example, the call is for the 'beneficiation' of the country's extensive mineral and agricultural products. Although there are dangers to this policy agenda (beneficiation, particularly of hard commodities, is often very capital and technology-intensive) there is a natural logic to this in many cases. Many commodities degrade rapidly and/or involve significant weight loss in processing. There are also evidenced cases of economies which have utilised their natural resources to drive forward their industrialisation (Wright and Czelusta, 2004). And, particularly in the processing of soft commodities, this is often a labour-intensive activity and wage costs in low income exporting economies are generally a fraction of those in high income economies. Moreover, commodity processing is often very polluting.

This logic of processing at source (rather than in the importing economy) applies easily – or relatively easily – when low income economies export commodities to high income economies. The high income economies are happy to see the pollution and energy

intensive production processes located in low income countries; their high-technology, skill-intensive, high-wage and safe working environments in their producing sectors are generally more appropriate to the provision of capital and intermediate goods for resource-processing industries rather than for the direct processing of commodities. However, when low income resource economies trade with low-income importing economies, many of these factors which promote a win-win division of labour do not apply (Table 8). Low income economies care less about the polluting nature and energy intensity of processing. Their industrial structures are well-pitched in terms of technological and skill intensity to specialise in processing, and their low labour costs enable them to do so at similar cost-profiles to those operating in low income exporting economies.

Table 8 High and low income commodity importing economies – complementarity and competition with low income commodity exporting economies

	High income importing economy	*Low income importing economy*
Pollution and energy intensity	High preference to outsource to exporting economy	Indifferent to location
Complementary or competitive industrial structures	Complementary – focus on technologies with high barriers to entry	Competitive – importers also have low technology industrial structures
Labour costs	High wages militate against labour intensive processing	Low wages facilitate labour-intensive processing
Labour standards	Working conditions are effectively protected by enforce legislation	Weak protective environment of working conditions

In the case of China and its imports of food products, there is an additional factor affecting the degree of processing involved in its imports. We have observed above, that the ratio of China's population to its arable land suggests that however effective its agricultural sector might become, it seems likely that it will have to draw on agricultural imports as its economy continues to grow, and as food tastes shift increasingly towards meat products. After a brief flirtation with the importation of food products, the experience of global shortages of key food crops in 2007 and the associated rise in political tension, in countries as diverse as Cameroon and Indonesia, has concentrated the minds of Chinese policy makers. In fact, China has pursued a strong self-sufficiency policy in grains since 1995, with the objective of domestic production meeting 95% of its domestic demand (Anderson and Peng, 1998). As a consequence, agricultural production shifted towards grains and away from other crops such as cotton, sugar beet and soybeans (Fang and Beghin, 1999). Given the shortage of land, this has increasingly meant that China's agricultural imports have been concentrated in animal feeds (such as soya and palm oil) and products which compete with grains for land-use (such as inputs).

There is another policy-related factor which also affects China's growing importation of agricultural products. In the context of a growing perception of a future energy-crisis, China has (like other countries such as the USA and the EU) begun to promote the production of bio-fuels. These need agricultural inputs, but given the primacy being given, for political reasons, to food self-sufficiency, China has increasingly sought to

source the inputs for bio-fuels from abroad as bio-fuel crops are generally planted on land used for food crops[4].

5 The impact of shifting markets and low income countries participation in GVCs

The rapid growth of the east Asian newly industrialising economies in the 1970s and 1980s, and of China, India, Vietnam, Indonesia, Central America and other emerging economies in the 1990s and 2000s was to a significant extent based on the expansion of their exports. Incorporated in GVCs, their exports were either directed to northern economies, or fed intermediate products into other countries' exports to northern economies.

In Section 3, we reflected on the nature of the post 2008 financial and economic crisis and the likely trajectory of the global economy. Even without stagnation and falling growth rates in the north, the growth rates of the past two decades in China and India are likely to lead to an outcome in which, by virtue of their size, they increasingly come to dominate the global economy in the 21st century. However, there are persuasive reasons to believe that key large northern economies (notably the USA, the UK and Spain) will reduce imports as they rebalance their global orientation, given their large structural trade and fiscal deficits. This will further accentuate the dominance of China, India and other low income economies in the growth of global demand in the coming decades. The question naturally arises, therefore, of what the potential impact of these shifting markets will be on commodity-exporting value chains.

5.1 Hypothesising the impact on commodity-exporting value chains

We believe that this change in the drivers of global demand – from northern to southern economies – will, by hypothesis, have four major sets of implications for global commodity value chains in the south arising as a direct consequence of the particular characteristics of demand in China and India. First, low levels of per capita incomes, coupled with rapid urbanisation and the growth of exchange as their economies become more diversified, will lead to a sustained growth in their demand for hard and soft commodities, both as a source of food and as inputs into infrastructure. Second, low levels of per capita incomes mean that the nature of demand will be for cheap, undifferentiated goods with low acquisition cost, running against the major trends in demand in northern economies after 1970 which increasingly favoured differentiated, high quality positional products. Third, the standards-intensity of GVCs feeding into northern economies has grown significantly and has become much more complex and demanding in recent decades. By contrast, GVCs feeding southern markets are likely to have much levels of standards, both in relation to products and processes. And, fourthly, northern and southern economies are often complementary in terms of economic structures. Northern economies have much higher wage costs and are very much more sensitive to the harmful externalities of polluting economic activities than are southern economies, and have increasingly outsourced processing to developing economies. By contrast, low income producing countries have similar economic structures and industrial trajectories to low income economy consuming economies, with the prospect of greater competition in the division of labour in GVCs.

5.2 Evidencing the emerging impact on commodity-exporting value chains[5]

The relatively rapid rise of China and India as final markets for global commodity producers means that evidencing the hypotheses drawn in Section 5.1 above can only be tentative. Nevertheless, the experience of Thailand's cassava exporters and Gabon's timber exporters is suggestive of wider trends.

5.2.1 Thailand's cassava value chain

Thailand is the dominant global exporter of processed cassava. In turn, cassava plays an important role in the Thai economy, and in 2007, was the second most important crop after rice in terms of value and the third in terms of volume. There are essentially two families of products in the processing of cassava, each of which has two sub-variants. The first product-family is dried cassava, which can either be exported in relatively unprocessed chip form, or as manufactured pellets. The second product-family is cassava-based starches, either in relatively unprocessed native-starch form or as higher value added modified starches.

The Thai cassava exporting industry had its origins in the EU's Common Agricultural Policy (CAP), where various components of price-support made imported cassava an attractive animal feed. Initially this cassava-based animal feed was imported in the form of unprocessed chips. But for a variety of health and safety reasons, EU cassava imports switched to pellets and were increasingly governed by a variety of food safety standards embodied in the EU's farm-to-fork policy. This not only mandated a minimum starch content, but required producers to achieve both hazard analysis and critical control point (HACCP) and good manufacturing practice (GMP) certification. However, the rapidly-growing EU market for cassava-based animal feed – which had previously been created by the CAP – was subsequently rapidly undermined by changes to the CAP. Thailand's exports to the EU fell from two million tons in 1989 to 250,000 tons in 2005.

Fortuitously for Thailand's large cassava sector, this decline in export markets was compensated by a rapid rise in China's imports of cassava. These rose rapidly, so that in 2005, the EU accounted for less than 10% of Thailand's cassava exports, with virtually all of the remainder going to China. However, although the overall level of demand from China was buoyant, its character was rather different to the exports which formerly went to the EU. In the case of dried cassava, China imported unprocessed chips (with no standard certification other than starch content), whereas the EU had previously predominantly imported processed, and standards-intensive pellets. Second, although China imported considerably larger volumes of cassava-starches than did the EU, over time these switched from higher-technology and higher value added modified starches to lower-technology and low value added native starches.

A number of trends can be discerned from this transition. First, China has become a dynamic market for Thailand's commodity exports. Second, when compared to the demands from the EU, these exports involved few standards in production. Third, the switch in final markets from the EU to China set in process a trend in which the degree of value added fell – from pellets to chips in the case of dried cassava, and from modified to native starches in the case of starches. Third, in terms of short-run developmental impacts, this switch in final markets was arguably positive, since this industrial downgrading (that is, the switch from pellets to chips, and from modified to native starches) was more labour- and less capital-intensive than the previous export regime.

Fourth, arguably this short-term positive developmental impact had the effect of undermining the development of Thailand's dynamic comparative advantage in the cassava value chain. The absence of standards in exports to China removed a key driver to learning, and the retreat from pellets to chips and from modified to native starches involved a retreat in knowledge-intensity in production. The market for modified starches is a particularly important case in point, since these starches have a growing number of uses, are increasingly differentiated, and are increasingly knowledge-intense.

5.2.2 Gabon's tropical timber value chain

Gabon's forests cover nearly 85% of its total land mass, making it the second most heavily forested country in Africa. It is the 3rd largest tropical timber exporter with a global market share of 16% in 2008. The timber value chain in Gabon consists of growing, logging, and the processing of logs into sawn timber, veneer and plywood, each involving progressively deeper value added and complex technology.

Gabon's timber value chain was largely a product of its colonial links to France. During the 1980s and early 1990s exports grew rapidly, predominantly to France, but also to other EU economies. Initially timber exports took the form of unprocessed logs, but increasingly value added was deepened, initially in the production of sawn timber, and then of veneer and plywood. This deepening of value added reflected a combination of factors. On the demand side of the equation, EU importers increasingly sought to import processed timber as labour costs in Europe were high and environmental regulations were stringent. On the supply side, the Forestry Code introduced by the Gabon state in 2001 introduced new types of concessions designed to embed sustainable forest management practices into industrial log extraction and required that by January 2012, at least 75% of total log production had to be processed before export.

Consumer pressures in the EU led to two further related changes. First, the demand for tropical wood fell due to concerns about global warming and environmental sustainability. And, second, European importers of tropical timber were increasingly concerned with environmental and safety standards, and log exports to the EU were subject to increasingly prevalent and more demanding forms of certification. These included industry-specific standards, such as Origine et Légalité des Bois (OLB) and Forest Stewardship Council (FSC), standards aflecting procurement of tropical timber by government agencies designed to protect biodiversity (such as the FLEGT programme, Forest Law Enforcement, Governance and Trade) and public standards affecting health and safety such as those covering formaldehyde emissions arising from the adhesives used to produce plywood, and chemicals used in the production of medium-density fibreboards or pollution from paint.

As in the case of the Thai cassava industry, the Gabonese timber industry was saved from declining EU demand by a massive expansion in tropical timber imports into China. Between 1990 and 2007, China's share of global imports rose from 14% to 68%, whilst the share of all OECD economies collapsed from 78% to 11%. With 1990 as the base-year, in 2007 China's imports of tropical hardwood had more than quadrupled in volume terms; in the same period, EU and wider OECD imports fell by more than 90%. This transition in global trade shares was mirrored in Gabon's export trade. In roundwood equivalent terms (that is, looking at the log equivalent of different types of timber exports), by 2008 Gabon's exports to China were more than three times greater than its exports to France, previously its dominant export market.

What were the consequences of this switch in final markets? As in the case of cassava, there was a collapse in the degree of processing. Whereas a rapidly-growing share of timber exports to France and other EU countries was occurring as sawnwood, veneer and plywood, virtually all exports to China were of unprocessed logs. Moreover, whereas standards had become increasingly demanding and prevalent in the case of timber exports to the EU, exports to China were virtually free of all standards. As in the case of Thailand's cassava exports, these standards have important implications for capability-building in Gabon, since meeting standards had become an important conduit for capability-building along the chain. And third, distinctive to timber, standards also promote environmental biodiversity, so that the withdrawal of many of the standards governing Gabon's timber exports had adverse environmental impacts.

Again, and even more than in the case of Thailand's cassava sector, there are important differences between the static and dynamic impacts of these changes. Whilst Gabon possesses significant resource-rents in timber-growing and logging, its timber-processing industry is extremely inefficient and many of these resource-rents are dissipated with the 'adding' of value. (In some respects, particularly in sawnwood, such is the degree of inefficiency that there is evidence of a "subtraction of value). Capital productivity is low in both veneer and plywood production and relatively few additional jobs are created for substantial levels of investment. On the other hand, Gabon possesses few opportunities for industrial development, and the erosion of its timber processing sector removes an important driver of industrialization and capability-building.

Evidence from three southern value chains – cassava in Thailand, timber in Gabon and palm oil in Malaysia provides corroboration for this broad argument. In cassava and timber, the market has shifted from the EU to China. In both cases, broadly speaking, this resulted in a reduction in the degree of value added and in the importance of process and product standards. But cassava and timber are relatively undifferentiated products, with low degrees of coordination and governance in their value chains. It remains to be seen, therefore, whether our hypotheses will also be evidenced in value chains historically producing more differentiated products and in more governed value chains for northern markets. But to what extent will these trends be evidenced in commodity chains producing even more highly processed products, as well as in manufactures and services?

5.2.3 Other commodity exports

Based on casual empiricism (that is, discussions with the Malaysian Palm Oil Board in November 2010), it is possible to observe similar trends emerging in other sectors, although these are not yet systematically recorded. In the case of palm oil, environmental concerns have led to strong chain governance to ensure environmental sustainability. Moreover In recent years, firms in economies such as Malaysia have begun to introduce a growing number of differentiated value added products. However, over the past decade, and particularly since the global financial crisis of 2008, the growth-markets for Malaysia's palm-oil products have been in China, India and Pakistan. In all of these three markets, there was little demand for the value-added products which Malaysia was increasingly exporting to the EU and North America. Equally, the standards which governed entry into the high-income markets (predominantly sustainability standards) were not required in these low-income markets. Similar trends of diminishing value added in commodity value chains when the market shifts to China have also been

observed in Brazil and Argentina in the case of soya (personal communication, Rhys Jenkins).

5.3 Generalising the impact on commodity-exporting value chains

If these examples of cassava, timber, palm oil and soya reflect a generalised trend, what wider implications might this have for GVCs in general, and commodity value chains in particular? Naturally this is a complex picture, reflecting different sectors and different types of low income economies. There are, however, some general observations which can be made. First, on the positive side, enhanced demand from the rapidly growing and very large Asian Driver economies provides the potential for a significant income-enhancing effect, with either an increase in export earnings, or some level of compensation for falling exports to the north. A second positive outcome is that there is often a link between process and product technologies such that products for low income consumers often involve labour-intensive process technologies (Kaplinsky, 2010b). Third, meeting the standards in GVCs serving northern markets generally is not just a costly exercise, but requires a literate and numerate labour force and forms of management which may be beyond the reach of many small scale enterprises. Accessing the Asian Driver markets may therefore be promoting of the role played by SMEs in GVCs.

On the 'dark side', achieving standards can often contribute to the development of upgrading capabilities by the firm, so that exclusion from demanding standards-intensive markets may undermine the drive to capability-building in the firm. Further, from the perspective of both the firm and the economy as a whole, the blocking of attempts to deepen value added by advancing along the value chain means that producers are likely to be stuck in pockets of static comparative advantage. Moreover, being confined to niches of low productivity (for example, value added per worker) is likely to undermine the move into the higher value added activities which underwrite high incomes.

It is clear from this that there is much ambiguity in outcomes. In particular we have little idea if what appears to be a pervasive phenomenon in commodities sectors also applies in the case of manufactures and services, or indeed in different categories of commodities (hard, soft or energy commodities). Another ambiguity in outcomes is that the restricted nature of evidence so far is not suggestive of effective policy responses. To what extent should developing country governments and producers passively accept this redefined role in their insertion into the global division of labour, as opposed to taking active attempts to both shape these new markets and the role which they play in these markets? Finally, the 21st century will undoubtedly be the century in which Asia regains its place at the centre of the global economy. This will have a wide range of very significant impacts on producers and consumers throughout the global economy. In this paper we have witnessed a relatively small ripple-effect. But it is suggestive of more profound challenges to the organisation of the global economy and polity with profound direct and indirect effects for low income economies.

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Notes

1 Adapted from Gale and Huang (2007)

2 Indian household size is considerably higher than in China, so these relative numbers of households do not reflect the number of people involved.

3 http://www.businessweek.com/globalbiz/content/aug2006/gb20060810_826414.htm

4 von Braun (2007) estimates if current bio-fuel and investment plans were to carry on, the world price by 2020, for major food crops could rise by 11% for cassava, 26% for maize, 18% for oilseeds, about 12% for sugar and 8% for wheat

5 For more detail on the cassava and timber value chains, see Kaplinsky et al., 2011.

Upgrading of smallholder agro-food production in Africa: the role of lead firm strategies and new markets

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Abstract: This paper addresses the main dynamics in the global agro-industrial value chains for tropical products. It examines new upgrading opportunities for smallholder production in Africa as a consequence of two dominant trends within global agricultural value chains. The first is caused by the dynamics of the co-existing collaboration and intensified rivalry between lead firms within the same chain. The other is caused by new opportunities and challenges stemming from increased requirements on retailer-driven markets in the North and expansion of new markets in the South. The paper points out the need to rectify the heavily biased policy focus on standard compliance with the purpose of strengthening smallholder incorporation and upgrading in retailer-driven strands of global value chains ending in the North. Instead, markets in the South and in emerging economies may function as a training ground for upgrading of African smallholder production via increases in volume and consistency of exports.

Keywords: tropical products; developing countries; emerging economies; Africa; corporate strategies.

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1 Introduction

This paper addresses the main dynamics in the global agro-industrial value chains for tropical products, in particular the upgrading potentials for smallholder production in Africa. Upgrading trajectories in the agro-food sector are usually examined in relation to particular crops or even strands within a particular crop, e.g., table grapes vs. vine grapes, fine and flavoured cocoa vs. bulk cocoa or fresh pineapples vs. processed pineapples. The aim of this paper is to generalise over common trends and opportunities for upgrading in what is referred to as typical 'tropical' crops namely the traditional export crops (coffee, cocoa, tea) and the 'new' crops (fresh fruit). These products constitute the lion's share of agricultural exports from the South to the North, and they are also increasingly important in South-South trade.

The paper starts with an outline of upgrading concepts in global agricultural value chains and suggests that despite variations in terminology and content, it is possible to examine new upgrading opportunities as a consequence of two dominant trends within global agricultural value chains. The first one is caused by simultaneously emerging forms of intensified rivalry and cooperative strategies among lead firms in different nodes but within the same (crop specific) chain. The other trend is caused by new opportunities and challenges stemming from increasing requirements on retailer-driven markets in the North and expansion of new markets in the South. Next, the upgrading opportunities are discussed within an overall framework of corporate rivalry and new forms of engagements with smallholder upgrading. In conclusion, the paper points to the need for rectifying the heavily biased policy focus on standard compliance with the purpose of strengthening smallholder incorporation and upgrading in retailer-driven strands of global value chains (GVCs) ending in the North. Markets in the South do not only offer outlets for lower quality goods but also potentially function as 'training grounds' for volume and consistency upgrading of both smallholder production and supportive national institutions.

2 Agro-industrial upgrading

The 'standard' way of conceptualising upgrading in GVC analysis was formulated by Humphrey and Schmitz (2002). They distinguish between:

1 process upgrading (inputs are transformed more efficiently by organisational or technical improvements)

2 product upgrading (production is moved into more sophisticated product lines, measured by, e.g., increased unit values)

3 functional upgrading (new functions are acquired, leading to the increased skill content of activities)

4 inter-sectoral upgrading (new productive activities are entered by firms – or clusters of firms – while leaving their traditional specialisation).

This typology is focused on organisational dimensions at the company and industry levels, even though a somewhat confusing spatial dimension (cluster) is included. Distinct types of upgrading in a particular GVC are claimed to depend on the 'type of value chain', that is, on the nature of the relationships that exist between the main actors involved in a transaction: 'Different forms of chain governance have different upgrading implications' [Humphrey and Schmitz, (2002), p.1023].

The upgrading issue was first incorporated into agro-food studies by Gibbon (2001) in the debate versus Cramer (1999) over the applicability and suitability of GVC analysis to examine questions of upgrading in developing countries. Gibbon argued that international trading companies are main drivers in some primary commodity GVCs, as they have historically organised the flow of tropical commodities from numerous small producers in the South to processing companies in the North. Gibbon maintains that different types of lead firms constitute different types of governance structure and argues that different possibilities for upgrading (at the national level) exist in trader-driven GVCs. Given the different nature of governance in international trader-driven chains compared with typical buyer-driven chains, exclusionary dynamics are different and smallholders can be cushioned from the vagaries of lead firms' cost-reduction efforts by mixtures of new and old types of public policy instruments, e.g., subsidies, buyers of last resort, etc. (Gibbon, 2001).

Gibbon's upgrading typology includes:

1 increasing the quality, volumes and reliability of supplies, and entering into more advanced sale and marketing arrangements

2 producing new forms of existing commodities, for instance, by starting production of GMOs or leapfrogging the world market for standard primary commodities by starting production according to new technical or user-specified commodity forms

3 localising commodity processing at the intermediate stage as a precondition for entry into the processing of final goods.

In particular, it is notable that sheer volume-based upgrading (i.e., the increase of production by territorially limited producers to a level attractive for international traders in order to reduce system coordination costs) is included. Although there is no exact match between Gibbon's three upgrading categories and the process, product and functional upgrading defined by Humphrey and Schmitz (2002), the two sets of distinct types of upgrading correspond fairly well. The differences may reflect the different nature of the products concerned, that is, agricultural raw materials as opposed to manufacturing goods.

In the absence of a commonly acknowledged GVC-based theorisation of upgrading – and contradicting his previous conceptual work – Gibbon (2003) later suggested that a useful analytical way forward may be to conduct more detailed empirical analyses of the

'reward structures' available to suppliers within GVCs on the one hand, and on the concrete roles releasing these rewards on the other, or in other words, the 'upgrading preconditions and mechanisms' for arriving at them [Gibbon, (2003), p.18]. Gibbon (2003) emphasises that concrete upgrading possibilities for actors below the level of lead firms need to be studied on a case-by-case basis by paying analytical attention to the different concrete roles that seem to offer suppliers higher and more stable returns, as well as the 'routes' for arriving at them (see also Gibbon and Ponte, 2005). The reward structures in GVCs refer to the rewards or opportunities available to producers in developing countries and the nature of the roles that trigger special rewards, for example, how premiums and discounts are determined in the international market for a particular crop (e.g., quality grades, securing contracts through forward sales agreements). Upgrading preconditions and mechanisms refer to specific national or local circumstances in which suppliers are able to generate higher and more stable rewards.

To our knowledge these ideas have not been further pursued empirically apart from a study on the upgrading processes in the South African wine industry by Ponte and Ewert (2009). In line with Gibbon's recent ideas they suggest an understanding of upgrading in agro-food GVCs as 'reaching a better deal including a balance between rewards and risk' [Ponte and Ewert, (2009), p.1637]. The analysis of upgrading trajectories is analysed through the lenses of Humphrey and Schmitz (2002) and Schmitz (2006), i.e., process, product, functional and inter-sectoral upgrading. These categories are, however, criticised on several points, notably with regard to the problems of placing various real processes unambiguously in one or the other category (e.g., is complying with food safety standards a process to be classified as product or process upgrading?).

Ponte and Ewert (2009, p.1647) conclude by suggesting a more detailed understanding of upgrading possibilities in agro-food GVCs that in many ways points back to Gibbon's initial ideas albeit further de-constructed by incorporating processes usually considered as 'downgrading':

1 Product upgrading should include effects on product quality that do not necessarily mean higher value added. For example, forward contracts and volume premia are strategies related to the product itself which can lead to higher prices and beneficial effects for producers, but do not change the nature of the product itself.

2 Process upgrading narrowly defined as transforming inputs more efficiently by organisational or technical improvements do not acknowledge (or include) improved practices that allow developing country firms and farms to improve or maintain their position in value chains in periods of restructuring (e.g., securing compliance with food safety standards or 'Fair Trade' standards).

3 Finally, functional (and product) upgrading should include forms that traditionally would be considered as 'downgrading' (e.g., selling lower value products at larger scale).

A new analytical avenue on upgrading situated somewhere between the abstract categories and the detailed empirical mapping of reward structures is offered by Lee et al. (2010). The authors suggest the prevalence of four distinct value chain structures, based on the degree of concentration in food production (farmers and manufacturers) and in food retail (supermarkets and other food retailers): buyer-driven chains, producer-driven chains, bilateral oligopolies and traditional markets. Lee et al. (2010, p.6) observe that 'each type of value chain structure is associated with a distinctive constellation of food

safety and quality standards reflecting the attributes of its lead firms' and that smallholder involvement and upgrading potentials therefore critically depend on the type of GVC in which they are engaged. In bilateral oligopolies (e.g., the GVCs for bananas and pineapples) and producer-driven chains smallholder opportunities for upgrading are likely to be limited: in the latter because of lead firms' (e.g., branded manufacturers) concern with quality-based competition and product differentiation and the presence of large processors in the chain (e.g., cocoa grinders and coffee roasters). In bilateral oligopolies, smallholder involvement and upgrading potentials relate to participation in outgrower schemes or contract farming with rather high entry barriers. On the other hand, in buyer-driven (or retailer-driven) chains, such as the GVC for fresh food and vegetables (FFV), significant upgrading opportunities for smallholders exist, despite retailers concern with product safety and control of potential risks along the GVC. Finally, traditional (domestic) markets found in many smallholder-based agro-food chains (such as fresh produce) have lower entry barriers, but upgrading possibilities are limited partly because of lack of adequate (public and private) support for upgrading.

This issue of the nature and scope of institutional support is of crucial importance for Neilson and Pritchard (2009) in their take on upgrading. The empirical case is upgrading in the coffee and tea industry in South India and they take their point of departure in the seminal work of Humphrey and Schmitz (2002). Neilson and Pritchard (2009) argue that the concept of upgrading provides a bridge that links the institutional dimension and the governance dimension of the GVC approach. Their entry point is a relational perspective that comprehends governance arrangements and institutional formations as being co-produced by internal, place-bound actors and external 'lead firm' actors. Referring to the notion of strategic coupling (Coe et al., 2004), they stress that 'prospects for upgrading hinge on how the multi-scalar industrial formations into which economic actors are embedded interact with new governance arrangements frequently set in train by agents remote from their immediate environment' [Neilson and Pritchard, (2009), p.211]. A few international tea and coffee manufacturers now dominate global trade in (branded) tea and coffee and therefore have huge potential to reshape the functional division of labour along the GVCs and reshape the socioeconomic and environmental outcomes upstream in the chain at production sites. Yet, the restructuring processes do not occur within a 'passive political landscape': the institutional environments of the South Indian tea and coffee plantation sector shape both upstream producers' capacity to participate in chains and the economic benefits they obtain from such participation.

The same focus on the importance of national and local institutions is found in Selwyn's (2008) more instrumental approach to upgrading processes in East Brazilian export horticulture, also based on the original categories put forward by Humphrey and Schmitz (2002). Importers that source for major retailers have offered training and transferred knowledge to potential Brazilian exporters of table grapes, in particular by conveying retailer quality requirements and assisting producers in their attempts to comply with these requirements, i.e., upgrading both product and processes. Even though these activities are considered crucial for the success of the grape exporters, Selwyn (2008) stresses the importance for upgrading of national research institutions and marketing boards as well as local technical service centres and producer organisations. In general, similar institutions may actually be the key drivers for the processes that unfold into upgrading: 'They can assist potential supplier firms to (a) gain access to global markets and (b) maintain their position in them' [Selwyn, (2008), p.391].

Hence, a number of competing but overlapping conceptualisations of upgrading in global agriculture value chains exist in the literature. What they have in common is their applicability to companies and national industries, and – in some cases – regions.[1] We wish to use these conceptualisations in a somewhat different manner to illuminate broader upgrading possibilities for agricultural exports from African smallholder-dominated economies. Our entry point is two general trends that drive global agro-industrial value chains, namely the dynamics of collaborative and competitive corporate (lead firm) strategies and the dynamics of markets, i.e., the continuous search for new markets for 'old' products and 'new' products for old (well-established) markets.

3 Main trends in lead firm strategies

Lead firms are here conceptualised as companies holding a position in the chain that allows them – within certain limits – to determine the operational and functional scope of other chain participants and thereby 'lead' the chain both in terms of division of labour, coordination and profitability. The power behind such a position is multi-facetted: it may have its roots in (oligopolistic) market dominance, technological capabilities, organisational competences, vertical integration or prominent advantages in other domains. The position as lead firm is not restricted to only one chain or strand of chain; these companies are often able to capture similar positions in other chains by adapting specific competitive advantages to other material and organisational conditions or by using corporate power to take over existing companies with slender portfolios of activities and limited market shares. However, the power of lead firms is not unbound, absolute or stable: lead firms struggle with other companies of similar strength over market shares and control of resource flows (material and monetary) both up- and downstream in the chain. In addition, they have to influence and adapt to the regulatory mechanisms and procedures set up by local, national or international institutions.

In the following sections (3.1 and 3.2) we deal with two somewhat contradictory trends in lead firm strategies in the GVCs for tropical products. The first trend is the intensified rivalry between lead firms in highly oligopolised GVCs where retailers and 'branders' of either fresh or processed food are struggling to maintain or improve their position in GVCs. The other trend is the increasing number of cases where lead firms engage in various collaborative schemes in order to solve or control salient issues that challenge the general functioning of the GVC. We limit our discussion to two iconic sets of agro-industrial value chains, namely the 'new' set of GVCs for fresh tropical fruits and the traditional set of GVCs for tropical beverages (coffee, tea, cocoa). These two sets of GVCs incorporate both trends but here we deal with them one by one in order to clarify our points and simplify the discussion: rivalry in the fresh fruit GVCs and engagement in the traditional tropical beverage GVCs. All the tropical agriculturally based GVCs are representative for actual or potential production of African smallholders, thus serving as a useful basis for drawing general observations on upgrading possibilities (see Section 5).

3.1 Intensified rivalry

Of particular interest for upgrading potentials in global agro-industrial (food) value chains is the increasing importance of large retailers (supermarket chains). In recent decades, retailers have conquered a substantial share of food sales from traditional food

stores (grocers, butchers, bakers, etc.) and now constitute the main outlet for foodstuffs in the industrialized countries and urban areas in many developing countries. Their importance varies from country to country depending on the level and distribution of income in combination with national habits and preferences. However, due to their control and position up-front in the consumer markets, supermarkets increasingly control their supply chains and set the conditions for other chain participants, including the 'traditional' lead firms in the food industry with basis in production, processing, logistics and distribution of agro-products. Whether or not one should designate the retailers as the lead firms (perhaps of the future) or dedicated food 'branders' with processing capacity is not the issue here; suffice it to maintain that the transformation and dynamics within agro-food value chains are results of the strategic and operational shifts in the activities of these two types of lead firms. Hence, retailers are to be considered as representing a set of particular strategic and managerial challenges – albeit a very important one – that food industry 'branders' further upstream the global agro-industrial chain have to handle.

Perhaps because bananas are the most important tropical fruit in international trade, global production and distribution are dominated by a handful of big companies (primarily based in the US) that historically have grown with the banana trade – Dole, Fresh Del Monte, Chiquita, and Fyffe's, the European parvenu. These companies also take up dominant positions in the global pineapple chain and are even involved in trade with other agro-products, including production, exports, processing and distribution of counter-seasonal (temperate) agro-products. Bananas and pineapples clearly dominate trade in the category of tropical fruits, both in terms of volume and value: the combined trade in tropical fruit now accounts for nearly 40% of the global fruit market, and bananas and pineapple constitute about 75% of tropical fruit exports to OECD markets (FAO, 2009).

These lead firms – 'branders' – are all vertically integrated with activities spread all over the value chain, i.e., stretching from plantation cultivation, harvesting, packing, transportation, shipping, ripening and distribution in addition to marketing and trade promotion. Actually, the only function they are not involved in is final retailing of the fruits. The branders control substantial volumes of global supply through various kinds of contractual arrangements with large-, medium- and small-scale producers (both international and local). The extent to which the production is outsourced depends on the specific regime for foreign investments, the composition and capacity of local producers, the quality of the infrastructure, etc. Also in other sections of the GVCs for bananas and pineapples, the most profitable way to exploit economies of scale may not be through vertical integration but by means of obtaining products or services through outsourcing and sub-suppliers of various forms of contractual relationships in shipping, marketing and different sorts of administrative work (Striffler and Moberg, 2003). Changes in these inter-firm relationships and the degree and nature of vertical integration are important parameters for shifts in organisational forms and chain governance.

Over the years – in some cases even before the retailer dominance in the Northern countries became manifest – these giant companies have established their brands as almost generic names for tropical fruits (e.g., the Chiquita banana in Germany). Hence, transnational companies involved in tropical fruit production and distribution muster substantial corporate power and do not consent to all demands from large retailers. Instead they vigilantly defend their brands in order to protect the higher margins they have consolidated during decades and struggle to avoid being relegated to suppliers of

private label products to large retail chains. Private label products provide a way for retailers to reduce purchasing costs from branded producers by marketing 'generic' products sourced from anonymous producers who cannot base their price setting on a brand (Burch and Lawrence, 2007).

The relatively recent phenomenon of category management (see for instance Dolan and Humphrey, 2004) actually supports the endeavours by transnational companies involved in tropical fruit exports to maintain their brands. The category manager is responsible for the logistics and organisation of the supply chain that brings the right combination of products within their specific category to the shelves in the supermarket. Hence, it is not just a question of providing the products in a cost efficient way but one of composing and sourcing the right mixture of category products that 'fit' the relevant consumer segment, thereby maximising total category sales (Dewsnap and Hart, 2004; Dupre and Gruen, 2004).

Category management became common in food retailing during the same period as the tropical fruit transnationals intensified their corporate globalisation, i.e., during the 1990s. Traditional branders with large-scale plantations and exports of tropical fruit have seized this opportunity and become *de facto* category managers in addition to their other functions. These companies have obvious advantages because production, harvesting, processing, packaging, shipping, storing and – not least – marketing of the whole product range are coordinated and controlled within the company. Assuming the responsibility as category manager elevates the company to a commanding position in the relevant supply chains but it also obliges managers to provide a full range of 'bundled' products to the supermarkets' customers. Concerns about visual appearance, food safety, convenience and ethics (e.g., environment, fair trade) are important markers of product differentiation and the creation of niche markets. Hence, tropical fruit transnationals seek to include business activities that expand their capacity to cover a broad range of demands in these segmented markets. As a result, retailers face large transnational companies with a diversified portfolio of highly branded tropical fruits that are difficult to replace with the supermarkets' own brands, not least because the transnational plantation companies control substantial parts of global supplies of the particular product category.

Thus, the GVCs for tropical fruits (or more precisely for bananas and pineapple) are at a general level characterised by a somewhat binary structure: a highly oligopolised part constituted by retailers and branders and a more market-based part made up by non-branded and independent plantation companies, exporters, packing houses, transporters, wholesalers and small retailing (green grocers). The point, however, is that these parts are neither homogenous entity nor isolated from each other; they interact in a complicated game of 'containment' strategies and tactical operations primarily driven by the retailers and branders. Retailers' overall objective is to sell private label goods while branders are to protect their brand. Alternative non-branded producers are an important means for the retailers but at the same time also for the branders in their aim for economies of scale and risk minimisation. Alternative outlets (wholesale and small retail businesses) are important for both branders and non-branders as a means to reduce retailer power by maintaining alternative routes to consumers (Gibbon, 2003).

Embedded in these inter-nodal struggles are all kinds of 'internal' competitive dogfights among retailers, importers and branders, particularly in periods of economic stagnation or contraction. Importers (e.g., independent category managers) of tropical fruit are being squeezed by large retailers mainly on two different but inter-related matters. On the one hand, prices are lowered and payments delayed (by up to 60 days

according to some observers) so that importers' liquidity is tight although financing is limited because of the problem-ridden banking sector. On the other hand, quality requirements are being braced up – a sharper focus on value for money means that importers have to deliver complete batches of up-to-standard fruits.

These pressures on importers (in some cases operating as category managers for retailing companies) are being catapulted upstream to suppliers (growers and exporters) of tropical fruits in developing countries. Hence, the adjustment of importers implies stricter attitudes to suppliers in developing countries, including different measures of the same type, namely price reduction and quality focus. Pressure on prices is transformed into stronger requirements on suppliers' capacity to implement production and quality monitoring and to overload additional services related to packaging, warehousing and logistics on the shoulders of suppliers. Standards that up until recently were considered satisfactory for entering Northern retailers' supply chains (e.g., GlobalGAP and HACCP) are now 'eroded' by the widespread existence of certificate holders and the trend towards stricter requirements (Gibbon and Lazaro, 2010). Instead of being a competitive edge, these standards have developed into a *sine qua non* for potential suppliers – holding these certificates are now a prerequisite for being considered at all. In addition, critical risk assessment results in reduced willingness to enter into pre-financing arrangements (except in cases of very well-established and long-standing business relations), long-term buying agreements, and new business relations with relatively unknown suppliers. Further, the volume of individual orders is diminished (also with respect to risk reduction) and the preference for dealing with a limited number of trusted suppliers is becoming markedly stronger (CBI, 2009). The quality issues are dealt with in Section 4.

Even though they have considerable leverage against retailers, the branders are not immune to these pressures as declining consumer demand caused by stagnating or falling incomes may erode the strength of their brand. The above-mentioned ways to cut costs in existing business are also prevalent in the activities controlled by branders, spanning from plantations to distribution. In addition, during periods of crisis some of the smaller and perhaps highly indebted companies in the chain become easy prey for take-overs by larger companies, notably the branders. Being able to cheaply add capacity to the already existing production not only increases economies of scale but also reduces the risk of being undermined by potential private label producers. However, there seem to be alternatives for branders to surrendering to the tyranny of cost-cutting, volume expansion and market shares. Branders are more inclined to defend their higher margin by diversifying product portfolios (including innovative products) of their high quality brand, a strategy that also encompasses the incorporation of certified products in accordance with ethical standards. On top of this, growth is attainable through new distribution channels and what is called 'new geographies': expanding the pool of suppliers by initiating mass production in areas where large-scale plantation production of tropical fruits has never occurred and finding new emerging markets in countries where private consumption so far has been relatively insignificant measured on a per capita basis (see Section 4).

3.2 New forms of engagement

The new forms of engagement are characterised by their inclusiveness in various strategic alliances of lead firms (with the exception of retailers) from one or several nodes in the

particular GVC. The direct and explicit reasons behind the establishment and development of these alliances are mostly found in the need for all the main parties in the GVC to demonstrate that certain basic principles concerning ethical and environmental impacts of production and processing are observed. Observation of these principles is considered to be crucial for continued and stable demand among consumers with great purchasing power in the markets of the North (see section below).

Other reasons are more hidden or implicit. They stem from the consequences of the widespread implementation of structural adjustment programmes (SAPs) in most African agricultural commodity producing countries. A substantial part of the general liberalisation packages was aimed at a removal of agricultural subsidies and the dismantling of national parastatals. However, transfer of export quality control and input supply (fertilizers, pesticides, extension services etc.) from public institutions to the private sector has proven problematic in most post-liberalised countries. Whether one can speak of a general decline in the quality of export commodities is unclear; presumably it varies between crops and national regulatory systems, and the extent to which public institutions were replaced by more efficient private companies (Fold and Ponte, 2008; Gibbon and Ponte, 2005). Suffice it to point out that at the turn of the century, abundant and homogenous supplies of commodities could not be taken for granted to the same extent as before. In addition, available land for many traditional export commodities also became relatively scarce, as much of the quantitative expansion of agricultural production in developing countries took place by cultivating more land rather than by increasing productivity, and competition for land from non-traditional export crops such as fruits and vegetables increased, partly due to SAP-induced incentive policies for export diversification.

Whatever the major cause may be – a need to establish basic principles for production and trade (possibly through standards), a need to increase the consistency and level of commodity quality, and/or a need to increase productivity in existing production – a common and new response on the part of lead firms has been to form various kinds of strategic alliances to cater for one or more of the pressing needs. The alliances are a quite recent phenomenon in the long history of competition between lead firms engaged in agro-businesses. As mentioned, alliances often encompass lead firms in different nodes of the value chain but they may also primarily include actors in only one of the core nodes. The trend is unmistakeable although the history is diverse in terms of the provoking factor behind the establishment of such alliances.

In the cocoa-chocolate industry, high-profile media campaigns during 2001 in the US about the widespread use of child labour in major West African cocoa producing countries spurred an initiative by members of Congress and consumer organisations which resulted in the so-called Harkin/Engel Protocol, an International Protocol committing the European and North American industry associations and major individual companies to ensure that cocoa is grown 'without abusive child or forced labour'. In 2002, this was organisationally followed up by the establishment of the International Cocoa Initiative (ICI) with the objective to promote responsible cocoa farming and eliminate abusive labour practices by the implementation of a certification system.

The ICI has a broad membership base including major branded manufacturers of chocolate and large grinding companies, the contract manufacturers that handle and process (grind) the lion's share of global cocoa supplies. Since the establishment of the ICI, its membership base has increased considerably and it has become one of the most important organisational structures to coordinate and monitor the projects and support

programmes initiated by the signatories of the International Protocol. As plantation production of cocoa is insignificant, maintenance of smallholder involvement in cocoa cultivation is absolutely vital for both the branded chocolate manufacturers and the grinders. Therefore, the major companies and business associations within the ICI now cooperate in order to revive cocoa production among smallholders in (over) mature cocoa areas, primarily in West Africa but also in Indonesia. The programme groups activities into two categories: one part focuses on responsible labour practices and child labour interventions and the other part focuses on health and vibrancy of local cocoa farming communities, including individual farmers' need for assistance. Hence, the issue of labour standards (countering abusive child or forced labour) has been aligned with efforts to organise African smallholders in a post-liberalised private regulatory structure. Notably, however, work on a matching certification scheme has only recently started with the initiatives to establish 'clean' cocoa supplies from communities where the 'worst forms' of child and forced labour are non-existent.[2]

Less spectacular media events and attention from politicians have been devoted to the tea business but the same set of concerns among tea manufacturing companies were already in 1997 behind the launching of the Ethical Tea Partnership (ETP). ETP is an alliance of over 20 European and North American tea manufacturing companies, covering more than 60 brands (The Ethical Tea Partnership, n.d.). The branded manufacturers were worried about public exposure and awareness of labour conditions on tea plantations (including the heated debate about child labour, bonded labour, excessive overtime and an unsafe working environment), and various NGO attempts to infuse the global tea value chain with some kind of ethical accountability [Neilson and Pritchard, (2009), p.136].[3] The ETP has drawn up a certification scheme that covers five areas, including employment (minimum age and wage levels), education, maternity, health and safety, housing and basic rights (SOMO, 2006). The scheme works on the basis of a system of graded certification, allowing suppliers to rectify non-compliances (Ethical Tea Partnership, n.d.). Currently, ETP monitors more than 1,200 plantations, and coordinates and maintains a list of approved plantation-based suppliers in the major tea producing countries [Kenya, India, Sri Lanka, China (initiated in 2006), Indonesia, Tanzania, Zimbabwe, and Malawi]. Hence, The ETP's coverage remains anchored on plantations, despite efforts to expand the scheme into the smallholder sector (Ethical Tea Partnership, n.d.).

Somewhere between the ICI's protracted struggle to monitor numerous cocoa producing smallholder communities in order to form and certify farmer groups with the ability to supply 'clean' cocoa of a consistent quality and the ETP's rather firmly established but limited certification scheme for plantations only, we find the UTZ Certified initiative in the coffee sector. Utz Certified (formerly known as Utz Kapeh) is a collective industry certification scheme established in 1997 by the Ahold Coffee Company together with coffee producers. Now it is an independent foundation in which corporate engagement has increased over the years to such an extent that it probably is the best known collective industry standard in the coffee GVC.

The establishment of the Utz standard can be viewed as a direct consequence of NGO pressure [Neilson and Pritchard, (2009), p.169] following the exposure of major corporate brands to allegations of negative environmental implications of intensified coffee production and deforestation. This, combined with the growing number of private standards with specific environmental objectives (such as Smithsonian Bird-friendly

(shade-grown) coffee) led to engagement in 'a series of baseline standards for acceptable practices related to coffee production' [Neilson and Pritchard, (2009), p.169]. The Utz standard covers environmental protection, workers' health and safety and certain social conditions. Utz Kapeh's coverage is (mostly) anchored in plantations where certification costs can be more readily absorbed [Giovannucci and Ponte, (2005), p.297]. But during the recent years there are a growing number of smallholder groups and cooperatives certified by Utz (Raynolds et al., 2007). Utz Kapeh and the NGO-led 'Solidaridad Network' have a strategic partnership in the main coffee producing countries where Solidaridad helps smallholders (and cooperatives) form producer/farmer groups, prepare for certification and learn good agricultural and processing practices. Monitoring of farms and plantations is done by private, Utz-approved certifiers and sales are registered in Utz Kapeh's tracking system. According to Raynolds, Murray and Heller (2007, pp.153-154), more than any other coffee industry initiatives, Utz Kapeh addresses large retailers' traceability demands, assuring that all coffee can be linked to its origin.

Summing up, the intensified rivalry among lead firms in the GVC for fresh tropical fruits to the North primarily takes the form of a struggle between large retailers and a few branders (of bananas and pineapples) who over time continuously strive to strike the most profitable balance between the outsourcing of activities and vertical integration – while also ensuring supply capacity of the complete product portfolio in the category. This struggle determines the basic dynamics of the GVC while other actors exploit all kinds of niche markets not covered by the retailers or branders. Of particular importance are chain actors that (potentially) have the capacity and willingness to fill out positions in an alternative supply chain for retailers. Opportunities for upgrading are thus determined by the strategic needs of the lead firms. In contrast, the new forms of engagement by branders prevalent in the GVC for tropical beverages include several different ways in which lead firms address upgrading issues among global suppliers that are to a large extent dependent on the importance of smallholder production in the particular GVC. So far, certification schemes are more prominent in GVCs where supplies primarily come from plantations but there is a trend towards more broad-based inclusion of schemes where smallholders are dominant producers. In the next section we turn to the dynamics on two different types of new markets.

4 New markets

This section deals with the market dynamics for tropical products, both the new niches in the old and well-established markets in the North and the new markets in the South where increasing income has spurred a dramatic rise in imports of many tropical products – and where market dynamics signal even higher potential for imports of a diversity of tropical products. We distinguish between traditional markets in the North, where demand growth is primarily based on product differentiation ('new' products), and 'new' markets in the South, where imports are primarily driven by a fairly homogenous demand for 'traditional' tropical products.

4.1 'New' tropical products in traditional markets

During the 1980s, fresh tropical fruits were sold mainly as 'exotic' products by supermarkets in Europe and North America and were used as a means to widen the

product range on supermarket shelves thereby attracting and maintaining consumer loyalty (Mather, 2008; Henson, 2006; Dolan and Humphrey, 2004). During the 1990s, however, there was a marked shift away from standardised, loose, tropical fruit products on offer by supermarkets and wholesale markets, to greater product variety, year-round supply, product innovation, and increased packaging and processing of tropical fruit products in Northern markets. A number of tropical fruits initially introduced as novel niche products in the 1980s in Northern markets, gradually matured as generic products in the late 1990s (thereby moving from niche to 'conventional' products in mainstream markets). As observed by Reardon and Flores (2006) and Fold and Gough (2008), supermarkets started to 're-format' many tropical fruits into various niche products in the 2000s, when new varieties of for instance melon, mango, or pineapples were also introduced. Fresh tropical fruit products traditionally sold in unprocessed form (e.g., whole pineapple or banana) were increasingly sold in a variety of semi-processed, ready-to-eat forms like vacuum-packed, sliced and mixed fresh fruits.

Similar developments are observable for tropical beverages (coffee, tea, cocoa), where a proliferation of new 'versions' (or 're-formatted' forms) of existing products has emerged in traditional markets in Europe and North America over the last two decades. In the context of overall stagnant or falling consumption of tropical beverages in Northern markets, product innovation and market segmentation represent important ways for branded manufacturers, supermarkets, and newly-established specialty 'operators' (notably in the coffee industry) to stimulate demand and/or defend their market position. In the 'mainstream' coffee markets in Northern countries, consumption has been stagnating, while so-called specialty coffee consumption has grown rapidly during recent decades. The specialty market (like niche markets for other tropical beverages) has been spurred by 'conscious' consumers and the rapid propagation of café chains and specialty shops where consumers can choose between different types, origins and ways of processing of coffee (Gibbon and Ponte, 2005). Generally, specialty coffee signals high quality coffee beans, often combined with specifications on the geographical origin of the coffee beans and/or ethical dimensions on labour and crop management. Over the last decade, the specialty market for coffee has grown annually by around 30% in the US, the world's largest coffee market; specialty coffee accounts for 20% of sales and captures roughly 40% of coffee revenues in the US. In Europe, differentiation in the coffee market is less pronounced, but the specialty coffee market is growing in importance. Annual specialty coffee sales in Europe and North America together account for approximately 10% of all imported coffee (Raynolds et al., 2007; see also Daviron and Ponte, 2005).

Tea consumption is increasingly seen as a tasteful and healthy alternative to coffee and soft drinks, hence in contrast to coffee, specialty tea consumption in North America and Europe is driven as much by growing consumer health concerns as by expanding high quality market segments. Apart from promotion of tea with geographical indicators (e.g., single origin estate tea or Darjeeling tea), new efforts to add value via more differentiated tea products include decaffeinated and flavoured tea (tea blended with fruit, spices, or herbs), instant tea, and ready-to-drink tea, such as iced tea. Although currently commanding only a small share of the global tea market, a number of specialty market segments are growing rapidly supported by massive advertising budgets by branded manufacturers and supermarkets. The most rapidly rising sales (and thus retail margins)

are for teas claiming health benefits: many herbal teas are marketed as 'wellness' beverages by the large branded tea manufacturers (Raynolds and Ngcwangu, 2010; SOMO, 2006).

Alongside the growth of niche markets for differentiated tropical beverages, the markets for certified organic and Fair Trade agro-food products have been steadily growing. Increasing demands for 'ethical products' are bolstered by their ties to broader social movement organisations that support the sale of 'sound' products to socially and environmentally conscious consumers (Raynolds and Ngcwangu, 2010). Consumption of Fair Trade products has historically been concentrated in Europe, but the US has emerged as the largest and most rapidly growing market in recent years. The Fair Trade market was pioneered in the late 1980s and consolidated in the late 1990s, when the Fair Trade Labelling Organizations International was formed to certify and promote Fair Trade products. Since then, the Fair Trade marketing channels have expanded with certified sales doubling from USD 1 to 2 billion between 2003 and 2006 [Raynolds and Ngcwangu, (2010), p.76] and, despite the recent economic downturn, sales of Fair Trade products achieved a 15% increase in global retail value in 2009, with estimated sales amounting to €3.4 billion [FLO, (2010), p.3]. In 2008, sales of Fair Trade tea increased by 112%, Fair Trade coffee sales increased 14%, and the market for Fair Trade bananas grew by 28%. However, even though the Fair Trade markets exhibited strong rates of growth through the 1990s and 2000s, the market share of certified Fair Trade products remains low for many agro-food commodities, typically in the range of 1% to 2% (Henson, 2006; Bacon, 2005). As pointed out by Bacon (2005) and Daviron and Ponte (2005), roughly 2% of the global coffee trade is certified Fair Trade, although in some markets there has been greater penetration. Fair Trade certified tea is still not as widely available as certified coffee, though major US supermarkets and café chains now sell a selection of certified tea varieties and brands (Raynolds and Ngcwangu, 2010).

Similarly, organic products (still) make up a minor share of the global agro-food market, but the proliferation of certified products and their increasing availability in mainstream supermarkets have made organics the fastest growing segment of the food industry in Northern countries (Raynolds, 2004; Willer, 2010). The market for certified organic agro-food products has grown from a very low base to reach 1.5%–2.5% of total food sales in both North America and the EU during the last two decades, with supermarket sales representing the most dynamic area of market growth (Gibbon and Bolwig, 2007; IFOAM, 2010). Organic products are now widely available in mainstream retailers' product portfolios: for instance in the UK Tesco is one of the leading retailers and sells over 700 organic products under its Tesco Organic private label (Sahota, 2009). North America and the EU comprise 97% of global sales revenues (with the USA and Germany being the largest markets). Organic sales are growing close to 20% annually in major markets in these two regions, despite the recent international economic crisis (Sahota, 2009; Vaclavik, 2010). Although Northern consumers prefer locally cultivated organic food they increasingly rely on organic imports, particularly from Southern countries, where production of certified organic products has grown rapidly. As markets have grown in Northern countries, the range of organic products imported has increased significantly to include a wide array of tropical products (like bananas, coffee, tea, cocoa, and spices), counter-seasonal produce (such as apples, pears, lettuce, and asparagus), frozen and canned produce, and processed foods (such as fruit drinks) [Raynolds, (2004), p.734].

Product differentiation and the 'flight to quality' in niche markets for traditional tropical beverages indicate possibilities for value addition related to the material quality attributes of cocoa, coffee beans or tea leaves – and consequently to higher price premiums. Illycaffe is an illustrative example of such a relationship. Illycaffe supplies the upper-end high quality segment of the coffee market and Illy Coffee is sold to 140 countries around the world (it is the leading espresso brand in Italy). As noted by Neilson and Pritchard (2009, p.218), Illycaffe has very specific quality requirements; hence, the company does not purchase coffee from international spot markets (or auctions), but instead develops relationships with individual suppliers in producing countries (Brazil, Guatemala, Columbia and increasingly India). In this way, Illycaffe is able to ensure price premiums for coffee estates meeting the company's standards.

However, brand manufacturers and retailers do not necessarily demand differentiated and highly specific material supplies despite a strategic focus on product differentiation. As argued elsewhere by Fold and Ponte (2008, p.152) in the case of coffee and cocoa: Processors own differentiation strategies are based on the ability to create differences from the same raw material and to add symbolic quality attributes to the products they sell. As Daviron and Ponte (2005, pp.43–45) argue, the intrinsic quality of coffee beans is only one part of the overall 'flight to quality' in the specialty market. With increased product differentiation, contemporary coffee consumers pay proportionally less for the material attributes of coffee quality and more for the 'symbolic quality and in-person services – including branding, packaging, consumption ambience and 'sustainability' content' [Fold and Ponte, (2008), p.152].

Some certified tropical organic products, however, are no longer perceived as niche, but rather mainstream products (e.g., organic bananas, coffee) and generally, premiums on organic products have fallen and organic farming has become less profitable in recent years – a sign of a maturing market (Gibbon, 2007; Kilian et al., 2004). Therefore, producers try to obtain certification in several internationally recognized standards (e.g., Fair Trade and organic) to improve their market position (for both high-value products such as bananas and traditional beverages like coffee) – certification is now a means of product differentiation in niche markets in the North. For example, in the case of coffee, there is an added premium for organic Fair Trade coffee, and this is reflected on the 'production side': 45% of the Fair Trade certified area in Latin America was also certified as organic production in the mid-2000s (Kilian et al., 2004).

4.2 Traditional tropical products in 'new' markets

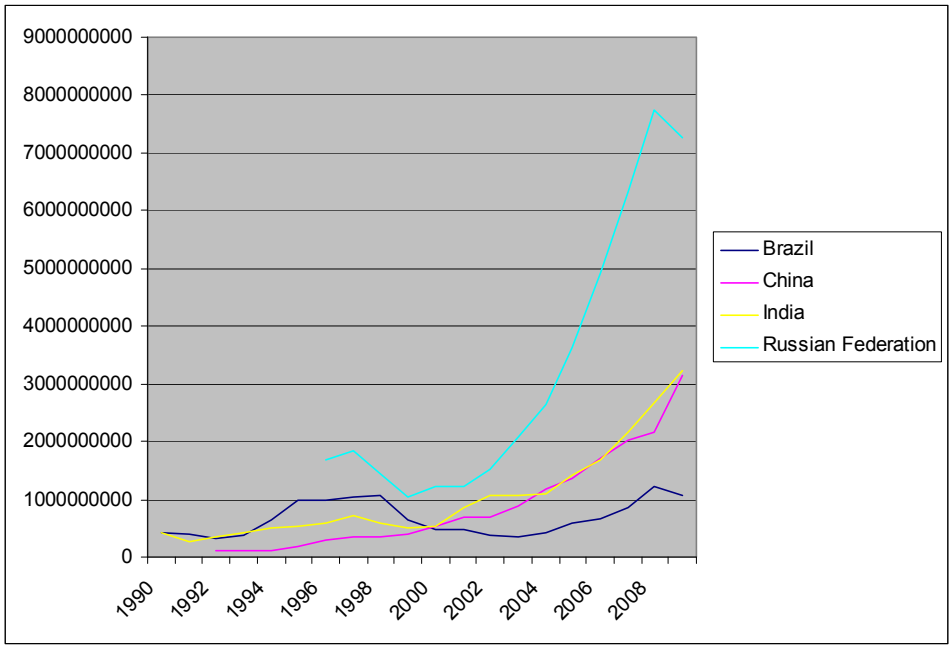
The emerging markets in the regions of Asia (outside Japan), Russia, Central and Eastern Europe, and Latin America together cover some 4.5 billion consumers and incomes per capita are growing three to five times faster than those of the developed regions of North America, Western Europe and Japan (Reardon, 2007). As noted by many sources (e.g., in the paper by Kaplinsky and Farooki in this special issue; Reardon, 2007), the emerging markets have shown impressive growth in imports of food products: Central and Eastern Europe doubled and Western Asia nearly doubled their food imports over the past two decades but most of the growth occurred in the past decade. Over a short time span, Russia has become the second largest agricultural importer among emerging markets after China (Liefert et al., 2009). Rising import demands for agro-food products are

driven by changes in food consumption patterns and dietary habits, notably within the growing urban middle class; it is estimated that emerging markets cover one billion middle class consumers, who constitute a bigger market than the traditional markets in the North.

For illuminative purposes, Figure 1 presents aggregate import value for vegetables and fruit in selected emerging markets, the so-called BRIC countries. The category 'vegetables and fruit' includes both tropical and temperate products such as apples and pears, and therefore these figures can only provide some indicative trends on the dynamics in import of tropical fruits in these markets. However, the trend expressed in Figure 1 indicates spectacular increases in imports of vegetables and fruit by consumers in the Russian Federation and a steady climb in India and China, albeit at a much slower growth rate. The trend for imports of tropical beverages in these markets is moving in the same direction (Figure 2). Imports of coffee, tea and cocoa to the Russian Federation grew dramatically from the early 2000s, while import trends for China, India and Brazil remain modest despite recent increases.

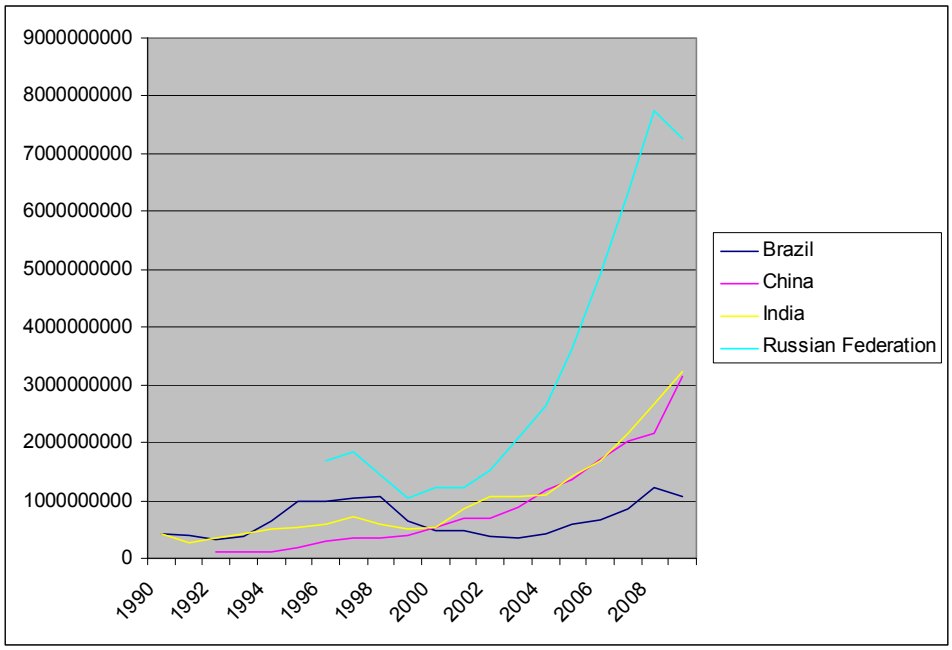
Enhanced demand from the rapidly growing emerging economies promises new export opportunities. However, market size and market growth are only one part of the 'story' (see Kaplinsky and Farooki's paper in this special issue). Another part involves the nature of final market demands (e.g., demands for products that are undifferentiated or differentiated according to quality, food safety or ethical considerations), and the role which this plays in inducing the direction of value adding activities amongst suppliers in the South.

Figure 1 BRIC countries: imports of vegetables and fruits (SITC 05, rev. 3); 1990–2009 (USD) (see online version for colours)



Source: COMTRADE

Figure 2 BRIC countries: imports of coffee, tea, cocoa, spices (SITC 07, rev. 3); 1990–2009 (USD) (see online version for colours)



Source: COMTRADE

Generally, emerging markets are regarded as markets where product differentiation, segmented niche markets, and quality and food safety standards are either weak or absent (Mather, 2008; Gibbon, 2007; Kaplinsky et al., 2010). However, there has as yet been no systematic research on these issues in emerging markets (Reardon, 2007). A few studies confirm the perception that agro-food imports to emerging markets might be of lower-value forms, reflecting that consumer preferences are mainly for products that are minimally differentiated or not differentiated at all (e.g., Gibbon, 2007; Reardon et al., 2007). For example, a study by Gibbon (2007) demonstrates that unit import price in Asia (other than Japan) and China in 2003–2005 was significantly lower than the world unit import price for cocoa, coffee, tea, and bananas. In addition, the average unit import price seems to have declined in the period from 1993 to 2005 in these markets. Consequently, Gibbon argues, that lower prices may reflect sales of 'conventional' products with average or inferior quality reputations or products that were characterised by other dimensions of poor quality. Mather (2008) notes that producers and exporters in South Africa's citrus export chain who are unable to meet the requirements of citrus buyers in Europe, North America and Japan, who demand higher quality, better variety citrus and compliance with food safety standards, instead export citrus to markets in Eastern Europe, Russia and the Middle East. On these markets, quality and traceability requirements are not important. For example, in non-citrus producing countries in the Middle East, it is possible to export fruit that may have been exposed to citrus diseases whereas sales are restricted in Europe (even though the fruits are not harmful to humans).

However, the 'retail revolution' in emerging markets points towards a potential counter tendency, namely for increasing product differentiation and requirements for

compliance with private standards (including ethical and/or food safety standards). Over the past decade(s), there has been a rapid spread of supermarkets in emerging markets, driven by the progressive liberalisation of retail FDI in many countries, often as part of the implementation of SAP and/or trade agreements. This has led to a 'rush' of foreign direct investments, mainly by Western European and US retailers such as Wal-Mart (USA), Metro (Germany), Ahold (Netherlands), Tesco (UK) and Carrefour (France) as well regional retailers (like Dairy Farm based in Hong Kong and present in Asian markets) or Jumbo based in Chile and present in Latin American markets. The average share of supermarkets in food retail has increased remarkably in most emerging markets. As illustrated by Reardon (2007, pp.7–8), the average share of supermarkets in food retail went from roughly 5%–20% in 1990 to 50%–60% on average by the early to mid-2000s in markets in South and Central America, East Asia (outside China and Japan) and Southeast Asia, Northern-Central Europe, and the Baltics.

The 'late-comers' in terms of supermarket penetration (starting in the late 1990s or early 2000s) like China, Russia and India also show significant expansion and supermarket sales have reached about 5%–20% of national food retail in the first decade of the 2000s. Western retailers have been reluctant to invest in Russia until recently, mainly because of economic and political instability, but major foreign retailer chains have recently entered or plan to enter the market. Metro (Germany) is by far the largest foreign retailer in Russia (Tiusanen, 2007) while Wal-Mart (US) is still (late 2010) in the process of entering through the acquisition of Lena, a Russian-owned retailer (Reuters, 2010). Carrefour, on the other hand, decided to pull out of Russia in 2009, apparently due to the recent global economic crisis (Gosling, 2010). The Russian retail sector, however, is still dominated by state-owned and domestic private retailers (e.g., X5 Retail Group) but most food items are sold through traditional grocery shops, open markets etc. (Tiusanen, 2007). Although the retail sector is growing, the top ten retailers still account for only 11% of total grocery sales in Russia (Marian, 2010). In China, Carrefour (France) was the fourth largest retail chain in terms of sales and number of stores in 2006, while Wal-Mart (USA) has become the *de facto* leading international retailer in the country, following a major acquisition of a Taiwanese-owned retail food chain in 2007. While transnational retailers have gained market shares, domestic retailers still play an important role in the Chinese retail food market [Tacconelli and Wrigley, (2009), pp.57–58).

This 'retail revolution' in the South has resulted in a trend towards adherence to internationally recognised standards (such as GlobalGAP) set by regional and global retailers. Reardon (2007) suggests that the implementation of stringent private food safety standards (such as GlobalGAP or country-specific versions of GlobalGAP like KenyaGAP, MexicoGAP, ThaiGAP) by supermarkets in emerging markets happens in cases where retailer chains have selected certain local products and producers to supply their local stores as well as their regional and global networks. There is ample evidence that regional or global retailers use their global (or regional) sourcing base in one market to efficiently supply their stores in other emerging markets: they 'intertwine' their local, regional and global sourcing strategies. One example is Wal-Mart, which sources avocados and grapes in Mexico and citrus in South Africa to sell in their stores in China. Others are Carrefour, which sources apples, pears, and oranges in China to sell into its stores in Indonesia, and Tesco, which sources vegetables in China to sell in Thailand. However, it remains an open question to what extent GlobalGAP or country-specific counterpart versions are required by global (or regional) supermarket chains, e.g., do they

apply these standards in intra-company transfers of products between South-South and South-North countries? Again, empirical evidence for this type of question is rare. One example is Driscoll's, which requires its Mexican growers to be GlobalGAP-certified because their berries are not only sold to chains in Mexico but also exported to other markets. Another example is Carrefour, which works with groups of vegetable and fruit farmers in China; the products are sold in Carrefour's stores in China but also circulated in their global network (e.g., pomelos are sold in France) and farmers are requested to comply with the company's quality and food safety standards [Reardon, (2007), p.21].

Finally, there is a growing but still marginal market for organic foods in Central and Eastern Europe. Also, a growing number of national and international food retailers in Asia and Latin America are introducing organic products and the number of dedicated organic food shops is also rising, especially in major cities in Latin America and in countries like Malaysia, Taiwan and Singapore (Sahota, 2009). For example, Carrefour has recently introduced organic fresh food products in their stores in China (Paull, 2008).

5 Potentials and prospects for upgrading of African smallholder production

As is evident from the above, trade in tropical agro-food products is increasingly governed by public and private food safety and quality standards, and producers and exporters in developing countries have to comply with food safety and quality requirements to gain access to markets in the Northern countries. The UK's Food Safety Act (1990) pioneered publicly imposed requirements for 'due diligence' and traceability in retailers' sourcing practices. Since then, the range of both public and private product and process requirements has been extended and the content of standards has become more demanding. At both national and regional level (e.g., the EU), public standards have become stricter with much higher minimum residue levels for pesticides and other chemicals, and a longer list of banned chemicals (Broberg, 2010). Further, there are a growing number of private food safety standards going beyond the requirements of public standards in the North, combined with a growing number of 'ethical' standards (e.g., Fair Trade and organic standards) [Gibbon and Lazaro, (2010), p.3]. The most visible case of private standards at present is GlobalGAP for fresh produce imposed by major European retailers (Campbell, 2005).

The overall trend for both public and private standards imposed in Northern countries is towards greater stringency, while the focus of standards is becoming both more vertical and horizontal in their coverage (Gibbon and Lazaro, 2010). For example, in terms of the 'whole chain' or vertical dimension, the range of activities for which Hazard Analysis Critical Control Point (HACCP) systems are required has increased both in public and private standards, as has the range of hazards for which testing is required [Broberg, (2010), pp.209–210; Gibbon and Lazaro, 2010]. Many standards are also being extended in a horizontal direction to cover a wider range of substantive issues. As pointed out by Gibbon and Lazaro (2010, p.4), the private GlobalGAP standard (formerly known as EurepGAP and established by a consortium of European supermarket chains) set down production criteria for traceability and food safety but has now been extended down to lot or farm site level and also incorporates references to environmental issues. In line with the same trend, organic standards have also entered new areas including climate impacts

of produce transport, the so-called organic 'carbon footprint' standards (see Bolwig and Gibbon, 2010).

There has been considerable discussion in the existing literature concerning the impacts of more demanding food safety and quality standards (including ethical standards) on agro-food exports from African smallholders. A number of empirical studies stress how difficult it is for many smallholders to achieve conformity to new and more demanding agro-food standards (e.g., HACCP or GlobalGAP) imposed in both mainstream and niche markets in Northern countries, or at least to take full advantage of the market opportunities resulting from compliance (Mbiha and Ashimogo, 2010).

The impact of the GlobalGAP standard for fresh fruit and vegetables on smallholder participation has been studied extensively in Kenya (see amongst others Dolan and Humphrey, 2004; Jensen, 2008; Legge et al., 2008). Smallholder involvement in the export sector has declined significantly following European retailers' requirement for exports to meet the GlobalGAP standard due to the size of necessary investments and demands for new management capabilities. Instead, smallholders engaged in the FFV export sector mainly produce for the non-retail market in Northern countries: Twice as many smallholders in Africa are involved in supplying the non-retail market compared to the supermarket chains in the UK and 25% of the volume of produce imported from Ghana, Tanzania, Uganda, Zambia and Kenya now flows to the catering sector (Legge et al., 2008).

On the other hand, the trend towards continuous product differentiation and market segmentation for both high-value tropical fruits and traditional tropical beverages provides African smallholders with new 'windows of opportunities' for upgrading. In the GVC for tropical fresh fruit there has been a transfer of processing activities from Northern importers (e.g., supermarkets) to Southern exporters and producers. Many former supermarket functions have now been pushed upstream of the supply chain, e.g., post-harvest processing such as washing, trimming, chopping and packaging of produce (including tasks such as bar-coding and labelling). For exporters and producers, the emergence of semi-processed, ready-to-eat products entails heavy investments in for instance cold storage and packhouses, and product and process parameters imposed by supermarkets (e.g., GlobalGAP) force them to acquire a range of new capabilities to retain their relationships.

Several GVC studies on the Kenya-UK fruit and vegetable chain suggest that for those companies and farmers that are able to carry out these functions, the upgrading rewards can be great (see Dolan and Humphrey, 2004; Henson, 2006; Mather, 2008). However, the same studies also document that higher performance levels and/or requirements for more functional capacity means that suppliers need to obtain economies of scale and acquire greater financial resources to carry overheads for additional service provision. This increases entry barriers to smaller and more poorly resourced companies and smallholder cooperatives. In Ghana and Kenya, production for retailers' supply chain of fresh fruit and vegetables is now mainly carried out by large contract farms linked to large-scale export companies, while the few smallholders that remain engaged in this supply chain are linked to growers/exporters in various forms of outgrower schemes (Fold and Gough, 2008; Legge et al., 2008).

For Fair Trade coffee as for other Fair Trade beverages, a number of studies have pointed out that access to certified Fair Trade markets for traditional tropical export crops leads to significantly higher prices and more secure sales outlets for smallholders than conventional markets in Northern countries (see amongst others Taylor, 2005; Bacon,

2005; Raynolds et al., 2007). As a socially-oriented scheme, Fair Trade aims explicitly to alter trade relations along the value chains, particularly aiming at increasing the benefits to smallholders. Fair Trade is unique among the range of new 'ethical' certification schemes because the buyer, rather than the producer, pays the cost of certification and monitoring by FLO. As these costs are passed downstream in the value chain, Fair Trade is mostly financed by the consumer's willingness to pay more for fair coffee, cocoa, or tea (FLO, 2010; Taylor 2005).

Price premiums on tropical organic products range between 20% to 40% (Raynolds, 2004; Willer, 2010) and recent studies suggest that certification to organic standards is associated with increases in prices, net incomes and income security for smallholders in the South (Mbiha and Ashimogo, 2010). A study by Gibbon and Bolwig (2007) documents that smallholders engaged in certified organic export production of organic coffee, cocoa and pineapple in Uganda had a significantly higher net income than those engaged in conventional production. The results, however, also showed enormous differences in profitability between organic farmers of different crops, with organic pineapple farmers earning three and five times more than cocoa and coffee farmers respectively. However, entry barriers in terms of initial costs of conformity to organic standards can be high. For smallholders, conversion costs comprise reduction in input of higher-value crops, inability to command price premiums during the conversion period, risks of temporary crop failures etc. (Gibbon and Bolwig, 2007; Gibbon, 2007; see also Raynolds, 2004).

Hence, access to both the 'ordinary' (retailer-driven) markets as well as the quality-conscious niche markets in Northern countries requires compliance with standards and certification. The former is by far the most important in volume terms but its nature and dynamics tend towards an exclusion of smallholders due to economic and technical reasons (scope of initial investments, economies of scale, monitoring costs, compliance capacity, etc.). Both process and product upgrading of smallholder production through the incorporation of producers in these chains is therefore becoming increasingly difficult. In contrast, smallholder concerns are more or less intrinsically embedded in the latter – at least they are very prevalent in the design of most ethical standards. However, the scope of these markets is still limited and smallholder access presupposes the 'luck' of being selected by the responsible organisations; so far only relatively few local smallholder communities are involved in these strands of the two GVCs for tropical products.

As a result, smallholder upgrading via involvement in both kinds of markets requires participation in outgrower schemes, contract farming, farmer groups or cooperatives. For Fair Trade (and to some extent organic) certified tropical fruits and beverages, formation of smallholder groups or cooperatives, training of smallholders in husbandry practices, accounting etc. is necessary. These concomitant upgrading costs are usually covered or heavily subsidized by the NGOs (or other types of organisations) that manage the particular scheme. Therefore, entry barriers might be lower in Fair Trade and organic schemes compared with various kinds of retailer-driven 'ordinary' strands organised as different kinds of contract farming or outgrower schemes.

As for these schemes, establishment and organisational costs are usually in the first instance financed by private contract manufacturers, exporters, and/or branded manufacturers – although many of the former commercially-oriented schemes in Africa were heavily subsidised or owned by state capital. However, these costs are somehow

reflected in farm-gate prices as affiliated smallholders are offered a purchasing price that takes into account the costs of initial establishment (soil preparation, seeds, planting, etc.) and maintenance (fertilizer, pesticides, harvesting, etc.) of the smallholders' particular crop land attached to the scheme. The periodic higher prices on local markets for certain food products therefore constitute a strong disincentive for selling according to the agreement between the two parties[4] with dire consequences for the profitability of the contract scheme. In addition, scheme managements struggle with what some consider as almost chronic problems with efficiency among outgrowers or contracted smallholders. This is the explanation for much stricter implementation of screening procedures to select farmers according to their ability to deliver a requested volume and quality of particular products. For smallholders, the result is rather high entry barriers and upgrading costs compared to those in schemes based on ethical concerns – albeit the 'search costs' for getting involved in the latter are most likely insurmountable due to their limited scope.

An interesting issue is whether the two co-existing trends among the lead firms – the intensified rivalry and the new forms of engagement – have any impact on the entry barriers and upgrading opportunities for African smallholders. As discussed above, the intensified rivalry seems to imply a move away from 'standard standards', i.e., standards that to some extent have become generic and generalised to such an extent that they are no longer considered sufficiently distinctive for marketing and differentiation purposes. To some extent, this is surprising as recent efforts have tried to establish common generic standards to ease producer compliance. African smallholders will most likely not face a slow diffusion of a common standard or set of similar standards but rather a proliferation of more isolated and increasingly demanding company, industry or country specific standards. Stricter standards require more monitoring and control over production to ensure that standards are observed and this leaves little if any room for individual smallholders. Rather, the trend is towards expansion of private capital involvement in the form of transnational agro-industrial lead firms and national growers/exporters moving upstream to control production directly through plantations operations (UNCTAD, 2009). In combination with the pressure from the World Bank and bilateral donors for land reforms that promote private property rights to and corporate ownership of land, the priorities seems to be how to promote large-scale capitalist agriculture rather than upgrading smallholder production in general. The breadth and depth of such a capitalist land alienation process in Africa's rural areas still remain to be seen.

However, the new forms of engagement point in the other direction of increasingly incorporating and upgrading smallholder production in the retailer-driven strands of the GVCs – with the important qualification that the extent varies considerably between crops. Incorporation and upgrading are – at least at the rhetorical level – most prevalent in the GVCs that are highly dependent on supplies from African smallholders (like the GVC for cocoa). Certification of smallholders is a complex task and ensuring traceability is difficult beyond the community level, i.e., to the individual smallholder. Other GVCs are less privileged both with respect to smallholder dominance and critical media attention. In the GVC for tea for instance, the media focus is more blurred and the dependence of smallholders is less pronounced. In this type of GVC, smallholder production is not to the same extent targeted for incorporation, and both process and product upgrading by lead firms and their alliances are primarily directed towards plantation workers and crop quality improvements.

Hence, the extent to which smallholder production is targeted for upgrading by lead firms due to their new forms of engagement depends on the existing supply structure and

the perspectives for transforming this basic supply pattern. The nature of the crop sets certain limitations and possibilities, and smallholder production will be more prevalent in GVCs where crops are storable and sturdy. For instance, smallholder involvement in cocoa production where beans can be stored for longer periods is more obvious than in GVCs for perishable products like bananas or pineapples. New varieties may even require more careful handling and shorter time between harvest, packaging and inclusion of the product in cold chains. As a corollary of the above, the rationale for incorporation and upgrading of smallholder production is higher in GVCs where the product is relatively less complicated to handle – although there are counteracting factors like ethical consumption schemes that favour smallholders (see above).

So what is left for the upgrading of African smallholder production if the space for conventional process and product upgrading is diminishing? A fair bit – although this is far less examined by research and apparently neglected by policy-makers. There are indeed alternatives to the more 'fancy' types of process and product upgrading linked to the retailer-driven chains and niche markets in the North. These alternatives are smaller in terms of volume and obtainable prices but some of them are rapidly growing. In these cases upgrading of smallholder production is linked to Gibbon's (2001) original idea of increasing the volume and consistency of exports, and Selwyn's (2008) as well as Neilson and Pritchard's (2009) point about the crucial role of local institutions in promoting upgrading: specific national and local institutions (e.g., research institutions, associations, marketing boards) shape upstream producers' capacity to participate in GVCs and their prospects for value chain upgrading (see Section 2).

There is still a market for ordinary, low-quality products in the North, mostly supplied through traditional wholesalers with commercial customers like small green grocers and catering firms. The size of this market is surely declining in North America and the countries of Western Europe, but it still plays a significant role in the rest of the world, even though retailers also supply a substantial and increasing part of the food market. Many African smallholders produce primarily for the local or regional market but they could potentially be involved in the export sector, producing for lower-value market segments in Northern countries and/or emerging markets.

The potential of emerging markets is poorly investigated and understood. A mechanical reaction is to point to the Chinese market as the big potential dumping ground for products of inferior quality. However, many urban middle income consumers are already demanding high quality goods and the retailers' market share in urban areas is rapidly growing. As for coffee and cocoa, previous marketing campaigns to expand demand have been of very limited success and tea is not an item with tremendous import potential! China imports more fruit than it exports (contrary to fresh vegetables, where the country is a huge net exporter) but China's import of fresh fruit is highly geographically limited to countries in ASEAN. There is also another side of the coin: already in 2006, China became the largest horticultural producer in the world. Each year it adds to its area under production the equivalent to the total horticultural production area in California [Reardon, (2007), p.5] and China has now emerged as a major agro-food exporter. Further, China is becoming an important exporter of organic agro-food products like fruits and over the last two decades, China has made a major move into the organic certified tea niche market (notably green tea) in the European countries. In a global context, organic certified hectares represented 2.5% of China's total agricultural land in the mid-2000s and China is second only to Australia in total certified organic hectares

(Paull, 2008). Thus, China is developing into a serious competitor rather than the source of a huge potential for volume upgrading of African smallholder production.

What seems to be more promising is the ravenous market in Russia and Eastern Europe and possibly also in the Middle East. Prices are obviously at a lower level but this is matched by lower or non-existing quality requirements and food safety standards. Thus, returning to our introductory discussion about upgrading concepts in agro-industrial GVCs, the emerging markets in Russia, Eastern Europe and the Middle East might function as a 'field of learning' for upgrading of African smallholder production via increases in volume and consistency of exports. In addition, these more accessible markets offer opportunities to improve performance in relation to traditional quality attributes of tropical products. This in turn points towards the important role of national institutional support for promoting upgrading, including for example well-functioning national systems for implementation of mandatory quality grades, extension services, etc.

6 Conclusions

The possibilities for African smallholder upgrading via retailer-driven strands of GVCs is steadily decreasing due to stricter requirements for supplier compliance with food safety and quality standards. These requirements result in a constant pressure upstream for increased monitoring and control over production, economies of scale and willingness to take up more low-profit functions outsourced from lead firms. Smallholders are difficult and expensive to incorporate and entry barriers are therefore high except for the relatively few smallholders who supply products in demand by ethically concerned consumers in the North. Nonetheless, multilateral and bilateral organisations, donors and agro-industrial lead firms have pushed for a policy with focus on these strands of the GVCs for tropical products.

It is time to re-think this policy fixation on the export potential in Northern markets and try to build up national institutions with the ability to stimulate smallholder incorporation and volume upgrading linked to expanding and less requiring markets in the South and emerging economies in the North, notably Russia. These markets are unmistakably growing and demand for traditional products has not reached the point where product differentiation is of the essence. Instead, basic quality criteria prevail such as products free of mould, of an adequate degree of maturity, of consistent but not necessarily high quality, etc. By directing attention to these markets, smallholders who previously produced for local markets may benefit from expanded market demand at acceptable prices. National institutions need to be established to cater for compliance with basic quality criteria, ensure agreed volumes and oversee consistent levels of quality. Competences in these basic tasks are important to control but they are difficult to acquire in situations where other and more complicated tasks are in demand such as ensuring compliance with a host of advanced standards for food safety, product quality and labour processes. In short, the argument is that markets in the South and in emerging economies not only serve as an outlet for smallholder production but also function as a training ground on which national institutions can be upgraded – and direct the upgrading of smallholder production.

This re-thinking must be situated in a more general discussion of a corresponding policy framework in African countries that takes into consideration the complexity of different opportunities in the many strands of GVCs for tropical products. As this paper

has revealed, each strand has its own combination and structure of lead firms, which in turn results in different possibilities for smallholder upgrading. This is, however, also an institutional problem because considerations of upgrading potentials in different strands need to be coordinated and not take place in institutions that are vertically organised such as crop-specific business associations. Obviously, these are the bodies of expertise but priorities have to be made in a horizontal perspective, encapsulating a range of GVC strands.

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Notes

1 See for instance Coe et al. (2004) for an explicit spatial take on upgrading (localised value creation, enhancing and capturing) within Global Production Network theory.

2 See http://www.cocoaverification.net/ for further details.

3 For instance, the Tea Initiative, an alliance of Dutch organisations, including development organisations and trade unions (Somo, 2006).

4 This phenomenon is often referred to as 'side-selling'.

Upgrading and restructuring in the global apparel value chain: why China and Asia are outperforming Mexico and Central America

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Abstract: This article uses the global value chain approach to analyse the upgrading trajectories of leading apparel exporters adapting to the end of textile and apparel quotas and the economic recession. These events have been coupled by the consolidation and reconfiguration of global supply chains. China has been the big winner while other Asian suppliers are expanding their roles, largely at the expense of regional suppliers. One key to Asia's competitive success vis-à-vis Mexico and Central America has been end market diversification. Regional trade agreements (NAFTA; DR-CAFTA) have provided the latter with preferential access to the US market and ties to brand manufacturers, but they also created a reliance on US exports and have hindered suppliers from developing regional linkages into textile production, apparel design and branding. Growing apparel demand in emerging Asian economies and a regionally integrated production network has allowed Chinese apparel suppliers to upgrade and expand global market share.

Keywords: economic crisis; apparel quotas; Multi-Fibre Arrangement; MFA; NAFTA; CAFTA; export diversification; production network; China; Mexico; USA.

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1 Introduction

The apparel industry has been one of the pillars of export-oriented industrialisation throughout the world since the 1970s. In recent years, the industry has experienced two shocks that have intensified international competition in this sector. The first shock is regulatory: the Multi-Fibre Arrangement (MFA), which established quotas and preferential tariffs on apparel and textile items imported by the USA, Canada, and many European nations since the early 1970s, was phased out by the World Trade Organization (WTO) between 1995 and 2005 via its Agreement on Textiles and Clothing (ATC). The second crisis is economic: the global recession that began in 2008 has dampened demand in the USA and other advanced industrial economies, leading to production slowdowns and plant closures in most apparel-exporting economies.

Trade restrictions have contributed to the international fragmentation of the apparel supply chain. The MFA/ATC system was designed to protect the domestic industries of the USA and the European Union (EU) by limiting imports from highly competitive suppliers. When the most competitive apparel exporters, Hong Kong, South Korea, Taiwan, and later China, reached their maximum levels under the quota system, they set up factories in less restricted nearby countries. The clothing assembly processes were sub-contracted to low-wage developing countries throughout the Asian Pacific region and elsewhere that had unused export quotas, such as Bangladesh, Sri Lanka, and Vietnam (Gereffi, 1999).

As a result, during the MFA the main end markets (USA and EU-15) tended to remain fixed, but which LDCs supplied these high-income economies varied with MFA quota rules. Apparel exporters' maintained ties with key US and European markets based on the quotas they were allocated. The key issue was entry into the apparel GVC through access to quotas; once a country was in the chain, the main upgrading strategy involved shifting from assembly to full-package production. There was also some product upgrading (shift to higher end products) and process upgrading comprised of machinery and logistics investments to increase productivity and speed to market.

This system was upended by the demise of MFA and the global economic recession. The elimination of quotas and safeguards coincided with the economic crisis (2008–2009) resulting in a consolidation among a limited number of large apparel exporters, while many smaller exporters were cut out of the chain. There was also significant downgrading or backsliding among Mexico and the Central American Free Trade Agreement (CAFTA) countries, due to their inability to meet Asian competition. The last two years have reinforced many of the trends occurring after the phase-out of

quotas. China, Bangladesh, Vietnam, and Indonesia are increasing their market shares in North America and the EU, primarily at the expense of near-sourcing options such as Mexico and the Central American and Caribbean suppliers to the USA.

To highlight dynamics of the structure of global apparel production in the post-quota and crisis era, we will zero in on a comparison of China versus Mexico – two large exporters that are engaged in head-to-head competition for the US apparel market and have experienced contrasting developments over the last 15 years/post-quota. While the next section of this article will show that consolidation at the level of leading apparel suppliers has indeed increased, the key to the different competitive dynamics of China and Mexico lies with distinct national strategies of development and very different patterns of regional integration, which will be the focus of the latter part of the article.

2 Leading exporters and shifting global geography in the apparel value chain

This section will highlight the country export picture over the 1995–2009 timeframe to identify the most and least successful apparel exporters in the post-MFA market. Overall, there has been consolidation on the supply side, as seen by the increasing concentration of the top 15 apparel exporters' share of total export trade. In 1995, the top 15 exporters accounted for 79% of all trade, and by 2009 this increased to nearly 87%; among the top five exporters for each year, concentration increased even more sharply from 59.5% in 1995 to 71.8% in 2009 (see Table 1). Table 2 shows the main export market destinations for the top ten apparel exporting countries in 2009. For all top countries, the EU-15 and the USA were two of the top three export destinations.

The main apparel exporting countries can be placed into the following categories:

1 Increasing or steady global market share
   - *China* – The clear winner in the global apparel export race during the past 15 years. Between 1995 and 2009, China's share of global apparel exports increased from 22% to 41%, representing an increase in value from $32.9 billion to $122.4 billion.
   - *Growth suppliers* – Overall, these countries have increased global market share since the early 1990s *and* through the economic crisis: Bangladesh, India, Vietnam, Indonesia, Sri Lanka, Pakistan, and to a lesser extent, Cambodia.
   - *Steady suppliers* – EU-15, Turkey, Tunisia, and Morocco. These countries increased export values until the effects of the economic crisis were felt in 2009, but managed to maintain relatively stable global market shares through the quota phase-out and recession.

2 Decreasing global market share
   - *Decline with quota phase-out* – These countries experienced declines during the MFA/ATC quota phase-out (1995–2005) that have continued during the crisis: USA, Canada, Mexico, DR-CAFTA, Thailand, Romania, and Poland.
   - *Past-prime suppliers* – These countries were once leading apparel exporters, but their global market shares have been decreasing since the early 1990s: Hong Kong, South Korea, Taiwan, and the Philippines.

Table 1 Top 15 global apparel exporters by year (see online version for colours)

Country/region	*Value (mil)*					*Global share (%)*				
	'95	*'00*	*'05*	*'08*	*'09*	*'95*	*'00*	*'05*	*'08*	*'09*
World	*152,532*	*193,728*	*268,416*	*335,831*	*296,901*					
China	32,868	48,017	89,829	130,382	122,389	21.5	24.8	33.5	38.8	41.2
EU-15	37,857	33,984	47,757	60,065	51,614	24.8	17.5	17.8	17.9	17.4
Extra EU-15	12,006	11,486	14,405	19,513	15,436	7.9	5.9	5.4	5.8	5.2
Bangladesh	2,544	4,862	8,026	13,463	14,185	1.7	2.5	3.0	4.0	4.8
Turkey	5,261	6,710	12,922	15,765	13,079	3.4	3.5	4.8	4.7	4.4
India	4,233	5,131	9,468	12,215	11,876	2.8	2.6	3.5	3.6	4.0
Vietnam	--	--	4,737	9,541	9,393	--	--	1.8	2.8	3.2
Indonesia	3,255	4,675	5,673	7,630	7,134	2.1	2.4	2.1	2.3	2.4
Mexico	2,871	8,924	6,683	4,634	3,923	1.9	4.6	2.5	1.4	1.3
Tunisia	2,400	2,645	3,476	4,489	3,787	1.6	1.4	1.3	1.3	1.3
Morocco	2,250	--	3,326	4,462	3,597	1.5	--	1.2	1.3	1.2
Sri Lanka	--	--	3,082	3,809	3,531	--	--	1.1	1.1	1.2
Cambodia	--	--	--	4,042	3,472	--	--	--	1.2	1.2
Thailand	2,706	3,672	3,860	4,201	3,469	1.8	1.9	1.4	1.3	1.2
Romania	--	2,737	5,172	4,216	3,223	--	1.4	1.9	1.3	1.1
Pakistan	--	--	--	--	3,193	--	--	--	--	1.1
Hong Kong	10,463	10,144	8,495	5,110	--	6.9	5.2	3.2	1.5	--
USA	4,402	5,157	3,681	--	--	2.9	2.7	1.4	--	--
South Korea	4,423	4,692	--	--	--	2.9	2.4	--	--	--
Other Asia	2,998	3,059	--	--	--	2.0	1.6	--	--	--
Philippines	--	2,599	--	--	--	--	1.3	--	--	--
Poland	2,306	--	--	--	--	1.5	--	--	--	--
Top 15 total						*79.2*	*75.9*	*80.5*	*84.6*	*86.9*

Notes: Apparel represented by HS 61 and 62 (HS1992); (--): indicates country not in top 15 in given year; retrieved 1/23/2011. Extra EU-15 is included to show that EU-15 would still be the #2 exporter without intra EU-15 trade; however total EU-15 trade value and market share are used in the top 15 percentages.

Source: UN COMTRADE (2011)

Table 2 Top apparel exporters, shifts in end market destinations: 2000, 2005, 2008–2009

			Export statistics to partner country/region											
Export country		*Partner*	*Value (mil)*				*Export share (%)*			*Share change*	*Rank*			
			'00	*'05*	*'08*	*'09*	*'00*	*'05*	*'09*	*'00–09*	*'00*	*'05*	*'09*
1	China	World	48,017	89,829	130,382	122,389							
		EU-15	7,444	23,162	41,750	39,728	16	26	32	17	2	1	1
		USA	6,514	17,802	25,178	25,367	14	20	21	7	3	2	2
		Japan	14,195	17,447	20,382	20,262	30	19	17	–13	1	3	3
2	EU–15	World	33,984	47,757	60,065	51,614							
		Extra EU15	11,486	14,405	19,513	15,436	34	30	30	–4			
		EU-15	22,498	33,352	40,551	36,178	66	70	70	4	1	1	1
		Switzerland	2,110	3,056	4,000	3,570	6	6	7	1	3	2	2
		USA	2,317	2,236	2,129	1,443	7	5	3	–4	2	3	3
3	Bangladesh	World	4,862	8,026	13,463	14,185							
		EU-15	2,481	4,801	7,823	8,108	51	60	57	6	1	1	1
		USA	2,088	2,422	3,562	3,510	43	30	25	–18	2	2	2
		Canada	101	360	530	619	2	4	4	2	3	3	3
4	Turkey	World	6,710	12,922	15,765	13,079							
		EU-15	5,209	10,462	12,720	10,750	78	81	82	5	1	1	1
		Poland	17	102	311	280	0	1	2	2		5	2
		USA	1,108	992	422	269	17	8	2	–14	2	2	3
5	India	World	5,131	9,468	12,215	11,876							
		EU-15	2,019	4,531	6,484	6,443	39	48	54	15	1	1	1
		USA	1,998	3,284	3,316	3,054	39	35	26	–13	2	2	2
		UAE	180	229	361	358	4	2	3	–1	4	4	3

Notes: Apparel represented by HS 61 and 62 (HS1992); exports represented by partner country imports. Retrieved 1/23/2011.
n/a: indicates data is not available for given year.

Source: UN COMTRADE (2011)

Table 2 Top apparel exporters, shifts in end market destinations: 2000, 2005, 2008–2009 (continued)

Export country	Partner	Export statistics to partner country/region										
		Value (mil)				Export share (%)			Share change	Rank		
		'00	'05	'08	'09	'00	'05	'09	'00–09	'00	'05	'09
6 Vietnam	World	1,595	4,737	9,541	9,393							
	USA	53	2,832	5,417	5,225	3	60	56	52	3	1	1
	EU-15	749	947	2,190	1,989	47	20	21	–26	1	2	2
	Japan	580	587	836	1,007	36	12	11	–26	2	3	3
7 Indonesia	World	4,675	5,673	7,630	7,134							
	USA	2,194	3,052	4,229	4,031	47	54	57	10	1	1	1
	EU-15	1,816	1,746	2,079	1,862	39	31	26	–13	2	2	2
	Singapore	n/a	213	243	196	n/a	4	3	n/a	n/a	3	3
8 Mexico	World	8,924	6,683	4,634	3,923							
	USA	8,695	6,282	4,164	3,508	97	94	89	–8	1	1	1
	Canada	135	280	282	238	2	4	6	5	2	2	2
	EU-15	27	57	99	92	0	1	2	2	3	3	3
9 Tunisia	World	2,645	3,476	4,489	3,787							
	EU-15	2,573	3,264	4,135	3,428	97	94	91	–7	1	1	1
	USA	28	55	72	61	1	2	2	1	2	2	2
	Japan	7	22	38	41	0	1	1	1	3	3	3
10 Morocco	World	2,444	3,326	4,462	3,597							
	EU-15	2,300	3,085	3,952	3,127	94	93	87	–7	1	1	1
	USA	100	59	96	61	4	2	2	–2	2	2	2
	Mexico	1	24	61	53	0	1	1	1	17	4	3

Notes: Apparel represented by HS 61 and 62 (HS1992); exports represented by partner country imports. Retrieved 1/23/2011.
n/a: indicates data is not available for given year.

Source: UN COMTRADE (2011)

3 Upgrading in the apparel value chain

There are several strategies countries can pursue to upgrade in the apparel value chain. Many of these are 'steps along the way' to achieve functional upgrading (Table 3).

Table 3 Upgrading in the apparel value chain

Upgrading type	*Description*
Functional in value chain	'Apparel manufacturers' acquire responsibility for more value-adding activities; a switch from manufacturer to service provider may occur: CMT→OEM→ODM→OBM→Lead firm
Integration in supply chain	Establish backward manufacturing linkages within the supply chain: Apparel→Textiles→Fibres→Machinery
Channel	Market diversification: acquire new skills by serving new buyers or markets often in emerging domestic or regional markets.
Product	Shift to more complex products or expand capabilities (diversify): Basic→Fashion (design) or Basic→Functional (R&D)
Process	Reduce cost, increase productivity and improve flexibility by investing in new or better machinery or logistics technology.

To help explain the dynamics in the post-MFA scenario of consolidating apparel exporters, three upgrading strategies will be outlined in this section: increasing functional capabilities and establishing backward linkages; export market diversification; and shifting from export markets to emerging domestic markets. These strategies are related in several ways, and are often combined with product and process upgrading. This section will present the factors that have affected the upgrading and downgrading experiences of leading apparel exporters since the MFA-phase out by linking countries to these upgrading strategies.

3.1 Increasing functional capabilities and backward linkages

The most important upgrading strategy deals with growing supplier capabilities among the most rapidly growing emerging economies. Apparel producing countries are typically categorised by the functional capabilities of the majority of apparel manufacturing firms within the country. The main categories of apparel manufacturers and apparel exporting countries are listed below and shown in Table 4:

- *Assembly/CMT (cut, make, trim):* the apparel manufacturer is responsible for sewing the garment and may be responsible for cutting the fabric and providing simple trim (buttons, zippers, etc.). The buyer provides product specifications and the fabric. The apparel factory is paid a processing fee rather than a price for the garment.
- *Original equipment manufacturing (OEM)/FOB:* the apparel manufacturer purchases (or produces) the textile inputs and provides all production services, finishing, and packaging for delivery to the retail outlet. The customer provides the design and often specifies textile suppliers. Free on board (FOB)[1] is a term used in industry to describe this type of contract manufacturer as well as full package.

a *OEM with domestic textile capabilities:* the shift from CMT to OEM is often associated with the development of a domestic textile industry. The addition of textile mills is an important step in supply chain upgrading. An industry for knitted textiles often develops before woven fabrics due to required capital-investment.

- *Original design manufacturing (ODM):* the apparel supplier is involved in the design and product development process, including the approval of samples and the selection, purchase and production of required materials. The apparel supplier is also responsible for coordinating OEM activities.
- *Original brand manufacturing (OBM):* the apparel supplier is responsible for branding and marketing of the final products. The apparel firm may do these activities on a contract basis on behalf of another lead firm, or it can mark the transition from apparel supplier to a lead firm typically in domestic or regional markets.

Table 4 Types and responsibilities of apparel manufacturers

Types	*Product development*	*Design*	*Textile sourcing*	*Apparel manufacturing*	*Distribution and packaging*	*Branding*	*Retail*
CMT	No	No	No	Yes	No	No	No
OEM	No	No	Yes	Y/N	Yes	No	No
ODM	Yes	Yes	Y/N	Y/N	Y/N	No	No
OBM	Yes	Yes	Y/N	Y/N	Y/N	Yes	Y/N

Notes: Y/N represents 'yes or no'; the main apparel manufacturer may or may not be responsible for the value-adding activity. Regardless the activity is not the focus of the apparel firm.

The desire of buyers to reduce the complexity of their own operations, keep costs down and increase flexibility to enable responsiveness to consumer demand has spurred the shift from CMT to OEM. Establishing and maintaining captive, buyer-supplier dependent relationships is costly for the lead firm and leads to inflexibility because of transaction-specific investments. Modular production networks provide the lowest costs to lead firms.[2] Therefore, logistics coordination and sourcing are frequently the first functional activities lead firms are willing to give up, and shift the responsibility to their first tier suppliers. Countries without sourcing capabilities are at a disadvantage moving forward.

CMT manufacturers usually focus on low-cost volume products. The Caribbean and CAFTA countries, Sub-Saharan Africa, and Cambodia are typically characterised as countries limited to CMT capabilities.

OEM full-package providers make up the bulk of apparel manufacturers. An increasing share of apparel manufacturers in Vietnam, Bangladesh, Indonesia, and Mexico fall into this category. These countries are still engaged in volume production, but are developing scale economies. To move into full-package supply, a strong textile connection is needed. Institutional support is often required to facilitate these backward linkages. This can be in the form of liberal foreign investment policies, regional trade agreements, or government investment incentives for capital investments or employment

generation. Mexico and Central America have built a very limited textile base for US market demand only, whereas countries like Turkey, India, China, South Korea and Taiwan all have strong domestic textile sectors. While having a domestic textile industry is not necessary to move into full-package (OEM) production, the ability to move beyond manufacturing to design, branding, and services (ODM or OBM) will be limited if the workforce does not have experience with textile production.

Full-package *service*-providing countries (OEM-ODM) coordinate supply chain and value-adding activities such as design, and invest or contract out manufacturing to other countries. Hong Kong, Korea, Taiwan were among the first countries to create these upgrading stages beginning in the 1980s, followed by other Southeast Asian countries including Malaysia and Singapore in the mid-1990s and most recently Thailand.

Turkey, the EU-15, India and China are OEM or ODM apparel exporters, but also have OBM capabilities in their home markets. These countries are capable of producing higher-value, more complex garments and volume production.

3.2 Export market diversification

Another upgrading option is export market diversification. Most apparel exporters are primarily a supplier to the US and/or the EU market, and to a lesser extent Japan. Diversification increased the prospects for growth because these mature markets are experiencing slowdowns in demand, and it is still unclear where the new normal consumption levels will fall when these economies rebound. Asian exporters have diversified end markets more so than Latin American exporters, which remain dependent on the US market.

Table 5 shows the dependence of the top ten apparel exporters on the leading import markets, the EU-15 and the USA, and the degree of diversification to other markets ('rest of the world') over the 2000–2009 timeframe. During the 2005–2009 timeframe, nine of the top ten countries increased export diversification. China is the only one whose share of exports to the rest of the world decreased, but this is primarily due to the impact of quotas and safeguards through 2008. Regardless, China is still far more diversified than any of the other leading exporters, with just over half (53.2%) of its apparel exports going to EU-15 and US markets.

Apparel manufacturers are not the only ones looking abroad; apparel brands and retailers are also expanding into emerging international markets for growth opportunities given weak domestic demand (S&P, 2010). Global lead firms are diversifying into new retail outlets and introducing their brand names into new end markets, making them a driver of this strategy.

The two North African countries in the top ten, Tunisia and Morocco, are an interesting comparison to Mexico because of their similar positions. All three are largely dependent on one market, the EU-15 in the case of the North African countries, and the USA for Mexico. Over the last ten years, all three have decreased dependence on their main export market from a range of 94%–97% to 87%–91% (see Table 2). However, Tunisia and Morocco's export values increased until 2009, whereas Mexico's export value has steadily declined since 2000. Even during the economic crisis years (2008–2009), both Tunisia and Morocco managed to increase exports to several emerging markets, including Russia, Poland and China for Tunisia, and Poland, China and the UAE for Morocco.

Table 5 Top ten apparel exporters (2009): export diversification

Rank	Exporter	EU15 + USA share (%)				Rest of the world (%)			
		2000	2005	2008	2009	2000	2005	2008	2009
1	China	29.1	45.6	51.3	53.2	70.9	54.4	48.7	46.8
2	EU-15	73.0	74.5	71.1	72.9	27.0	25.5	28.9	27.1
3	Bangladesh	94.0	90.0	84.6	81.9	6.0	10.0	15.4	18.1
4	Turkey	94.1	88.6	83.4	84.2	5.9	11.4	16.6	15.8
5	India	78.3	82.5	80.2	80.0	21.7	17.5	19.8	20.0
6	Vietnam	50.3	79.8	79.7	76.8	49.7	20.2	20.3	23.2
7	Indonesia	85.8	84.6	82.7	82.6	14.2	15.4	17.3	17.4
8	Mexico	97.7	94.9	92.0	91.8	2.3	5.1	8.0	8.2
9	Tunisia	98.3	95.5	93.7	92.1	1.7	4.5	6.3	7.9
10	Morocco	98.2	94.5	90.7	88.6	1.8	5.5	9.3	11.4

Notes: Apparel represented by HS1992 61+62; exports represented by partner country imports. Rank represents 2009 global export value rank (see Table 2).

Source: UN COMTRADE (2011)

3.3 Shift from exports to domestic or regional markets

Some of the larger, more advanced apparel suppliers such as China, India and Turkey are also reorienting production from export markets to large domestic and nearby regional markets (Gereffi and Guler, 2010). These largely untapped local markets often permit more opportunities for functional upgrading into ODM and OBM business models and may also provide easier entry for smaller exporters and can be used as a learning laboratory for more advanced activities.

Many of the strongest growth rates in the global apparel retail industry are coming from East Asian markets. In 2009, the global apparel retail industry reached $1,032 billion, with the Asia-Pacific region increasing global market share to 25.5% from 21.9% in 2008 (Datamonitor, 2010a). The apparel retail industry in the Asia-Pacific region[3] had a compound annual growth rate (CAGR) of 4.0% over the 2005–2009 time span, with strong growth from India (9.9%), China (7.9%), and South Korea (3.9%) offsetting declines in the Japanese market (–0.8%). From 2009 to 2014, the Asia-Pacific region is forecasted to grow at a faster compound growth rate, 3.2%, than Europe (1.7%) or the USA (1.9%) (Datamonitor, 2010b).

Apparel manufacturers in India have been developing brands for the domestic market (OBM) in addition to providing exports to international buyers since the 1990s. Most large apparel exporters have introduced their own brands in the Indian market and many have also established their own retail chains to distribute their apparel labels. These developments have been driven in recent years by a decline in export demand, the emergence of malls as a distribution outlet, and the rise of a younger generation of middle-class consumers working in service centres in India's major cities (Tewari, 2005).

Due to China's increasing standard of living and the current economic downturn, domestic manufacturers and other Asian apparel exporters are looking more realistically at China as a key market. China is particularly attractive for Hong Kong-based firms that enjoy duty-free access to the mainland under the Common Economic Partnership Agreement, provided the goods are manufactured in Hong Kong (Mehta, 2010).

Emerging markets that are not already leading apparel exporters are other diversification targets. In Russia, apparel imports increased from only $146 million in 2000 to $4,225 million in 2008, and back down to $3,674 million in 2009. China is Russia's primary supplier, but many other leading apparel exporters, including Turkey, India, Vietnam, Bangladesh, Indonesia, and Morocco, have increased exports over the last five to ten years. These countries are also increasing exports to other large emerging markets including the UAE and Poland.

4 China and Asia versus Mexico and Central America in the global market

This section will look at two major apparel suppliers and their regional networks, China and Mexico, and how they have taken contrasting paths over the last 15 years. China's apparel exports have been booming over the past decade and Mexico has been losing ground. Mexico has been exporting almost exclusively to the USA with very weak domestic demand in Mexico, while China has a much broader mix of export products and markets including a growing domestic and East Asian regional market for its apparel output.

4.1 China and Asian Partners: increasing market value and share

China has not only increased its share of global exports, but has also diversified its export partners. Between 1992 and 2009, China's top ten apparel export markets decreased from 98.6% to 91.1%. In 1995, Japan and Hong Kong represented 62.7% of China's apparel exports of $32.9 billion, with the USA and the EU-15 accounting for another 29.1%. By 2009, China's apparel exports nearly quintupled to $122.4 billion, and the EU-15 and the USA took the top two export partner positions, accounting for 53.3% of China's apparel exports, while Japan and Hong Kong held 27.3% (see Table 6). Since the end of safeguards and quotas, China has been exporting to new markets, including Russia and Poland. China's apparel exports are increasing to every top ten apparel importing country with the exception of Hong Kong.

China has a large and growing domestic market for apparel, which is supplied to a growing extent by China's own apparel producers. In 2007, the estimated value of sales to the Chinese apparel market totalled $93 billion for the year, indicating that 44% of the overall apparel production activities in China were for local consumers (Clothesource, 2008)[4].

4.1.1 China's extended network: South Asia and Southeast Asia

Due to rising production costs, China is no longer the most cost competitive apparel exporting country. Transnational manufacturers and lead firms are shifting orders to nearby Asian economies, including Vietnam, Bangladesh and Cambodia, for price-sensitive items (Mehta, 2010). South Asian countries have all increased market share to both the EU-15 and the USA. Post-MFA and during the crisis, Bangladesh has performed well in both markets, but India, Sri Lanka, and Pakistan have shifted focus to the EU-15. South Asian countries receive preferential access to the EU under the generalised system of preferences (GSP) scheme, yet they do not receive benefits in the USA (Gereffi and Frederick, 2010).

Table 6 China's top ten apparel export markets by year: 1992–2009 (see online version for colours)

Country/region	*Value (mil)*					*Market share (%)*				
	1992	*1995*	*2000*	*2005*	*2009*	*1992*	*1995*	*2000*	*2005*	*2009*
World	*14,183*	*32,868*	*48,017*	*89,829*	*122,359*					
EU-15	2,954	4,462	7,444	23,162	39,728	20.8	13.6	15.5	25.8	32.5
USA	4,744	4,913	6,514	17,802	25,367	33.5	14.9	13.6	19.8	20.7
Japan	4,685	10,308	14,195	17,447	20,262	33.0	31.4	29.6	19.4	16.6
Hong Kong	--	10,301	13,875	15,851	13,102	--	31.3	28.9	17.6	10.7
Canada	389	366	703	2,442	3,595	2.7	1.1	1.5	2.7	2.9
Australia	425	640	1,055	2,200	2,963	3.0	1.9	2.2	2.4	2.4
South Korea	74	381	867	2,138	2,202	0.5	1.2	1.8	2.4	1.8
Russia	--	--	--	--	1,923	--	--	--	--	1.6
Poland	--	--	--	--	1,346	--	--	--	--	1.1
UAE	--	--	--	--	1,067	--	--	--	--	0.9
Saudi Arabia	243	193	340	808	--	1.7	0.6	0.7	0.9	--
Singapore	65	--	--	576	--	0.5	--	--	0.6	--
Norway	--	242	337	622	--	--	0.7	0.7	0.7	--
Switzerland	303	309	342	--	--	2.1	0.9	0.7	--	--
Macao	96	--	--	--	--	0.7	--	--	--	--
Top ten total						*98.6*	*97.7*	*95.1*	*92.5*	*91.1*

Notes: HS1992 (61+62); exports reported as country imports; (--): indicates country not in top ten in given year; retrieved 1/23/2011.

Source: UN COMTRADE (2011)

Both Vietnam and Cambodia have been gaining EU-15 and US market share since the early 1990s. During the crisis (2008–2009), however, Vietnam has managed to maintain its value, volume and market share far better than Cambodia (Table 8). Indonesia and Malaysia are increasingly more important suppliers to the US market than the EU and both have started to focus on growing textile exports as well. Thailand has been negatively impacted by the MFA phase-out, and the Philippines' US and EU-15 market share has fallen since the early 1990s.

4.2 US regional suppliers: declining value and market share

The USA and its periphery include NAFTA members (USA, Mexico, Canada), the DR-CAFTA signatories (Central America and the Dominican Republic), and other economies in the Caribbean Basin Initiative (CBI). Nearly all of the US regional suppliers have been negatively impacted by the MFA phase-out. Mexico's apparel industry is almost entirely reliant on the US market. From 1992–2000, 97% of exports were to the USA. With the signing of the NAFTA agreement, exports to Canada increased from 1.5% in 2000 to 4.2% by 2005 and to 6.1% by 2009. In 2000, Mexico and the EU signed a free trade agreement facilitating the boost in exports from Mexico to the EU post-2000. Exports have slightly increased to the EU-15, Japan, and Australia since 2005, but these are still marginal markets for Mexico, accounting for less than 5% of all apparel exports.

Table 7 Mexico's top five apparel markets by year: 1992–2009

Country/region	*Value (mil)*					*Share (%)*				
	1992	*1995*	*2000*	*2005*	*2009*	*1992*	*1995*	*2000*	*2005*	*2009*
World	*1,138*	*2,871*	*8,924*	*6,683*	*3,923*					
USA	1,107	2,805	8,695	6,282	3,508	97.3	97.7	97.4	94.0	89.4
Canada	11	25	135	280	238	1.0	0.9	1.5	4.2	6.1
EU-15	16	19	27	57	92	1.4	0.7	0.3	0.9	2.3
Japan	2	7	27	20	15	0.2	0.2	0.3	0.3	0.4
Australia	1	--	--	--	9	0.0	--	--	--	0.2
South Korea	--	--	--	6	--	--	--	--	0.1	--
Costa Rica	--	4	6	--	--	--	0.2	0.1	--	--
Top five total						*100.0*	*99.6*	*99.6*	*99.4*	*98.4*

Notes: Apparel represented by HS1992 (61+62); exports represented by partner country imports; (--) indicates country not in top five in given year; retrieved: 1/23/2011.

Source: UN COMTRADE (2011)

Similar to Mexico, the CAFTA-DR and CBI region is solely reliant on the US market, and exports have decreased over the last decade. The CAFTA-DR regional trade agreement with the USA offers preferential access to the US market only for those countries that assemble apparel goods under complex rules of origin that favour US-made fabric. Certain exceptions have been made in granting access to the least developed

countries in the Central America and Caribbean region, most notably Nicaragua and Haiti, who are granted preferential access to the US market for apparel that utilises textiles coming from outside the CAFTA-DR region (usually from Asia).[5] In the last several years in certain products like cotton woven trousers, Nicaragua has been the only CAFTA-DR economy whose apparel exports to the USA have increased, largely due to its guaranteed tariff preference levels (TPLs), which are due to expire in 2014 (Gereffi and Bair, 2010). Although regional trade agreements like CAFTA-DR and NAFTA have facilitated access to the US market for signatory countries, they have mixed results in terms of upgrading because they encourage a reliance on US or local inputs, which may not be competitive in terms of the global economy.

4.3 China and Mexico in the US market

In 2009, US consumers spent $188.5 billion on clothing, down by 5.2% from 2008 (S&P, 2010). According to Standard & Poor's, China, Egypt, and Haiti[6] were the only three countries to experience gains in the US apparel market in 2009. Table 8 shows trends for the top 15 countries that supply US apparel imports. Most striking is the dramatic increase in China's import share, which climbed from 10.5% of all US apparel imports in 2000 to 23.7% in 2005 and 37.9% in 2009. Mexico experienced the most dramatic decrease in market share during this period, falling from 14.6% in 2000 to just 5.4% in 2009.

Mexico's main export items to the USA are highlighted in Table 9. They are highly concentrated with the top ten export products accounting for 73% of total apparel exports in 2009. Of the top ten US apparel import categories from Mexico in 2009, nine experienced a decline in value between 2005 and 2009. The two products that increased were t-shirts made from textile materials elsewhere classified and M&B wool suits.

US imports from China are much less concentrated than Mexico's. Whereas the top three products from Mexico accounted for over 50% of all US apparel imports from that country in 2009, China's top ten apparel exports to the USA in 2009 represented less than 40% of its total apparel exports to the US market. Only five of the top products in 1996 were the same as in 2009; in Mexico, eight of the top ten were the same in both years. When looking at data from 1996–2004, the other products in the top ten were all made from 'textile materials NESOI'[7]. By 2009 none of these products were still in the top ten.

Mexico and China compete in the US apparel market in four main categories: men's and boys' (M&B) and women's and girls' (W&G) cotton woven trousers and cotton and man-made fibre (MMF) knitted sweaters and sweatshirts[8]. For Mexico, cotton woven trousers are the main products destined for the US making up 41% of US apparel imports from Mexico in 2009. M&B cotton woven trousers are the only category of the four mentioned in which Mexico remained ahead of China in 2009 in terms of market share, although Mexico's share has been steadily falling. China took over the leading position from Mexico in 2006 for the W&G market. Bangladesh and Vietnam, and to a lesser extent Egypt are all increasing their share of the US market (USITC, 2010). Cotton and MMF sweaters and sweatshirts are China and Mexico's other main products competing for US market share. For both cotton and MMF, Mexico led China in US market share until 2005. Other major country competitors include Vietnam and Indonesia; two countries that have decisively shifted focus to the US market over the 2000–2009 timeframe.

Table 8 US apparel imports: shifts in top 15 countries: 1995, 2000, 2004–2005, and 2008–2009 (see online version for colours)

Country/region	*Customs value (millions $USD)*						*Market share (%)*					
	'95	*'00*	*'04*	*'05*	*'08*	*'09*	*'95*	*'00*	*'04*	*'05*	*'08*	*'09*
Total	*36,103*	*59,206*	*66,869*	*70,807*	*73,102*	*64,296*						
China	4,653	6,202	10,721	16,808	24,000	24,362	12.9	10.5	16.0	23.7	32.8	37.9
Vietnam	--	--	2,506	2,665	5,151	5,008	--	--	3.7	3.8	7.0	7.8
Indonesia	1,189	2,060	2,402	2,882	4,035	3,870	3.3	3.5	3.6	4.1	5.5	6.0
Mexico	2,779	8,618	6,845	6,230	4,129	3,482	7.7	14.6	10.2	8.8	5.6	5.4
Bangladesh	997	1,942	1,872	2,268	3,355	3,345	2.8	3.3	2.8	3.2	4.6	5.2
India	1,163	1,852	2,277	3,058	3,122	2,886	3.2	3.1	3.4	4.3	4.3	4.5
Honduras	932	2,416	2,743	2,685	2,675	2,107	2.6	4.1	4.1	3.8	3.7	3.3
Cambodia	--	--	--	1,702	2,371	1,869	--	--	--	2.4	3.2	2.9
EU-15	1,740	2,245	2,289	2,171	2,065	1,400	4.8	3.8	3.4	3.1	2.8	2.2
Pakistan	--	--	--	--	1,508	1,319	--	--	--	--	2.1	2.1
El Salvador	--	1,602	1,720	--	1,533	1,297	--	2.7	2.6	--	2.1	2.0
Thailand	1,042	1,841	1,822	1,833	1,696	1,248	2.9	3.1	2.7	2.6	2.3	1.9
Sri Lanka	919	--	--	1,653	1,490	1,220	2.5	--	--	2.3	2.0	1.9
Guatemala	--	--	1,947	1,817	1,388	1,103	--	--	2.9	2.6	1.9	1.7
Philippines	1,489	1,876	1,765	1,821	--	1,016	4.1	3.2	2.6	2.6	--	1.6
Hong Kong	4,261	4,492	3,879	3,523	1,559	--	11.8	7.6	5.8	5.0	2.1	--
DR	1,698	2,390	2,036	1,831	--	--	4.7	4.0	3.0	2.6	--	--
Korea	1,661	2,263	1,808	--	--	--	4.6	3.8	2.7	--	--	--
Taiwan	1,917	1,951	--	--	--	--	5.3	3.3	--	--	--	--
Canada	774	1,745	--	--	--	--	2.1	2.9	--	--	--	--
Top 15 share							*75.4*	*73.5*	*69.7*	*74.8*	*82.2*	*86.4*
CAFTA+DR	4,725	9,059	9,559	9,150	7,668	6,214	13.1	15.3	14.3	12.9	10.5	9.7

Notes: US imports general customs value; apparel represented by HS61+62. The (--) indicates that a country is not in the top 15 for the given year.

Source: USITC (2010)

Table 9 Top ten US imports from Mexico by year: value

HS code	*Customs value (mil)*					*Product description*			
	1996	*2000*	*2005*	*2008*	*2009*	*Product*	*Gender*	*Fibre*	*Fabric*
Total	*3,743*	*8,618*	*6,230*	*4,129*	*3,482*				
620342*	745	1,657	1,431	1,177	1,067	Trousers	M&B	COT	WVN
610910	371	963	570	491	403	T-shirts	N/A	COT	KNT
620462*	451	1,462	1,013	435	361	Trousers	W&G	COT	WVN
611030*	216	419	281	225	139	Sweatshirts	N/A	MMF	KNT
620343	79	256	231	151	124	Trousers	M&B	SYN	WVN
610990	124	156	130	69	104	T-shirts	N/A	NESOI	KNT
611020*	112	394	332	170	98	Sweatshirts	N/A	COT	KNT
611595	--	--	--	93	93	Socks	N/A	COT	KNT
621010	188	233	150	109	90	Garments	N/A	N/A	WVN
620311	--	--	--	--	73	Suits	M&B	Wool	WVN
611241	--	--	142	86	--	Swimwear	W&G	SYN	KNT
621143	--	--	114	--	--	Garments	W&G	MMF	WVN
621210	176	262	--	--	--	Bras	N/A	N/A	Either
620463	--	140	--	--	--	Trousers	W&G	SYN	WVN
610463	96	--	--	--	--	Trousers	W&G	SYN	KNT
Product's share of total US imports from Mexico (%)									
620342*	19.9	19.2	23.0	28.5	30.6	Trousers	M&B	COT	WVN
610910	9.9	11.2	9.2	11.9	11.6	T-shirts	N/A	COT	KNT
620462*	12.1	17.0	16.3	10.5	10.4	Trousers	W&G	COT	WVN
611030*	5.8	4.9	4.5	5.4	4.0	Sweatshirts	N/A	MMF	KNT
620343	2.1	3.0	3.7	3.7	3.6	Trousers	M&B	SYN	WVN
610990	3.3	1.8	2.1	1.7	3.0	T-shirts	N/A	NESOI	KNT
611020*	3.0	4.6	5.3	4.1	2.8	Sweatshirts	N/A	COT	KNT
611595	--	--	--	2.3	2.7	Socks	N/A	COT	KNT
621010	5.0	2.7	2.4	2.6	2.6	Garments	N/A	N/A	WVN
620311	--	--	--	--	2.1	Suits	M&B	Wool	WVN
611241	--	--	2.3	2.1	--	Swimwear	W&G	SYN	KNT
621143	--	--	1.8	--	--	Garments	W&G	MMF	WVN
621210	4.7	3.0	--	--	--	Bras	N/A	N/A	Either
620463	--	1.6	--	--	--	Trousers	W&G	SYN	WVN
610463	2.6	--	--	--	--	Trousers	W&G	SYN	KNT
Top ten	*68.3*	*68.9*	*70.5*	*72.8*	*73.3*				

Notes: US general imports customs value; NESOI: textile materials not elsewhere classified. The * indicates product is also in China's top ten products; (--) indicates product is not in the top ten in the given year.

Source: USITC (2010)

Table 10 Top ten US imports from China by year: value: 2005–2009

HS code	*Customs value (mil)*					*Product description*			
	2005	*2006*	*2007*	*2008*	*2009*	*Product*	*Gender*	*Fibre*	*Fabric*
Total	*16,808*	*19,868*	*23,970*	*24,000*	*24,362*				
611020*	534	1,047	1,760	1,993	2,781	Sweatshirts	N/A	COT	KNT
620462*	639	807	1,162	1,271	1,936	Trousers	W&G	COT	WVN
611030*	721	912	1,160	1,020	1,130	Sweatshirts	N/A	MMF	KNT
620342*	391	--	560	591	900	Trousers	M&B	COT	WVN
611120	821	917	1,032	952	860	Garments	Baby	COT	KNT
621210	491	666	689	789	774	Bras	N/A	N/A	Either
620630	--	486	698	669	654	Shirts	W&G	COT	WVN
620520	--	--	--	539	626	Shirts	M&B	COT	WVN
620293	426	527	633	588	513	Jackets	W&G	MMF	WVN
620443	--	--	--	--	460	Dresses	W&G	SYN	WVN
620469	847	903	747	709	--	Trousers	W&G	NESOI	WVN
611090	891	838	623	--	--	Sweatshirts	N/A	NESOI	KNT
620193	423	468	--	--	--	Jackets	M&B	MMF	WVN
Product's share of total US imports from China (%)									
611020*	3.2	5.3	7.3	8.3	11.4	Sweatshirts	N/A	COT	KNT
620462*	3.8	4.1	4.8	5.3	7.9	Trousers	W&G	COT	WVN
611030*	4.3	4.6	4.8	4.3	4.6	Sweatshirts	N/A	MMF	KNT
620342*	2.3	--	2.3	2.5	3.7	Trousers	M&B	COT	WVN
611120	4.9	4.6	4.3	4.0	3.5	Garments	Baby	COT	KNT
621210	2.9	3.4	2.9	3.3	3.2	Bras	N/A	N/A	Either
620630	--	2.4	2.9	2.8	2.7	Shirts	W&G	COT	WVN
620520	--	--	--	2.2	2.6	Shirts	M&B	COT	WVN
620293	2.5	2.7	2.6	2.4	2.1	Jackets	W&G	MMF	WVN
620443	--	--	--	--	1.9	Dresses	W&G	SYN	WVN
620469	5.0	4.5	3.1	3.0	--	Trousers	W&G	NESOI	WVN
611090	5.3	4.2	2.6	--	--	Sweatshirts	N/A	NESOI	KNT
620193	2.5	2.4	--	--	--	Jackets	M&B	MMF	WVN
Top ten	*36.8*	*38.1*	*37.8*	*38.0*	*43.7*				

Notes: US general imports customs value; NESOI: textile materials not elsewhere classified. The * indicates product is also in Mexico's top ten products; (--) indicates product is not in the top ten in the given year.

Source: USITC (2010)

5 Why China is winning and Mexico is losing

The following section seeks to explain what has enabled China to gain US market share over Mexico so rapidly and decisively. A number of key factors are identified below that involve both the upgrading and institutional aspects of these economies (see Table 11 below for a comparison of China and Mexico on a number of factors).

5.1 Process upgrading

The Chinese government started promoting the apparel and textile industries as a key growth sector around 1980 and has helped firms increase productivity by investing in new spinning machinery, shuttleless looms, and quality control technology to decrease defect rates. China has also made significant investments in logistics technology to facilitate supply chain collaboration and reduce lead times. Investing in technological upgrading was a means to increase China's market share in both low-end, high volume as well as high-end products.

In terms of shipments of textile-processing equipment, China is ahead of Mexico in every machinery category. During the 2000–2009 timeframe, China was the leading global recipient of circular knitting machinery (both single and double jersey), electronic flatbed knitting machines, shuttleless looms, open-end rotors, and short-staple spinning machines. On the other hand, Mexico's investment in textile machinery has remained relatively stagnant. Mexico ranked 18th and 19th for single and double jersey knitting machine shipments, 32nd for electronic flatbed, 22nd for shuttleless looms, and 12th for short-staple spinning machines (Anson and Brocklehurst, 2010a, 2010b; Brocklehurst and Anson, 2010). China also has significantly higher installed capacities than Mexico in all textile categories.

5.2 Product quality, capacity, timeliness and diversity

China is considered by industry experts to be the best in making garments at any quality or price point, and can provide a wide assortment of fabrics and finished goods (Anson, 2009; USITC, 2004). China is not just a competitive supplier of one type of clothing, but nearly every type of clothing. In 2008, China was the largest US supplier of clothing of all four fibre types by volume: cotton clothing (27%), MMF clothing (42.8%), wool clothing (58.6%), and silk/vegetable fibre clothing (86.1%) (*Textile Outlook International*, 2009). China has a strong, well-developed domestic textile industry capable of producing a wide variety of quality yarns and fabrics required for the different types of apparel.

China has a reputation for consistency; suppliers continually provide quality products with timely deliveries (just-style.com, 2009; Tewari, 2006). Chinese factories are often cited as having the best skilled workers and productivity, quality, speed, production capacity, product development, technology, storage facilities, and transportation (Robinson, 2010). On the other hand, Mexico's product quality and production reliability are problematic (USITC, 2004). Mexico's apparel production has a heavy concentration in three main product categories (woven cotton trousers, knitted sweatshirts, and t-shirts), with the top ten products accounting for over 73% of the total value of US apparel imports.

5.3 Labour and cost

The average price of US apparel imports has fluctuated over the last ten years due to the cost of quotas and Chinese safeguards. As these restrictions were removed from the most cost competitive producers with the largest market shares, prices started to decline. Over the last two years, the decline in the average price of US clothing imports from China has had a detrimental effect on the average prices of imports from other suppliers as they

have been forced to drop their prices in order to compete with China (just-style.com, 2010).

During the last decade, both China and Mexico have pursued strategies to keep workers' wages low, but China is able to provide lower labour and unit costs than Mexico (Robinson, 2010). China's labour costs are higher than many regional Asian neighbours, but are still lower than Mexico's. Overall costs remain low due to China's high productivity levels. In addition to an ample supply of efficient, skilled labour and management capabilities, China has a positive, proactive business approach backed by established industrial clusters and infrastructure systems that offset rising labour costs (Anson, 2009; Gereffi, 2009; Robinson, 2010; USITC, 2004).

Despite recent increases in labour costs due to labour legislation, currency appreciation and domestic growth, China is still considered a low-cost provider of textiles and apparel. In the short term, rising costs have been exacerbated by labour shortages as orders pick-up and production recovers from the recession. Other factors leading to increasing prices include stricter product safety and compliance requirements and increasing monitoring costs, rising energy, and transportation costs. Furthermore, the undervaluation of the yuan is a widely debated issue, as the USA has claimed it is a major source of the US-China trade imbalance. The yuan has increased in value by about 20% since 2004, but has been held fairly constant during the crisis period of 2007–2009 (Clark and Milberg, 2010). Rising costs in China have spurred firms to expand their sourcing portfolio to include countries with lower costs, but sourcing is shifting to other Asian competitors rather than to US regional suppliers (*Global Apparel Markets*, 2009; Anson, 2010; Tucker, 2009).

Mexico is faced with higher labour costs and lower productivity than Asian competitors. Mexican apparel firms lack strong management capabilities and importers face additional costs related to security and compliance with trade agreements (USITC, 2004).

5.4 Economies of scale, backward linkages, and government support

China's apparel industry takes advantage of scale economies in two ways. Many of China's production networks operate seamlessly through firm-specific and product/cluster-specific supply-chain cities (Appelbaum, 2008; Gereffi, 2009). Firm-specific clusters are large, vertical factories with all supply chain sectors and value-adding activities in one place. These are often owned by Hong Kong and Taiwanese investors, and they are located in the Guangdong area. The Hong Kong Polytechnic Institute estimates that about 50% of all apparel and textile companies in China's coastal cities have some element of vertical integration (INS, 2009). They are designed to reduce lead times, minimise transactions costs, take advantage of economies of scale, and foster more flexible supply chain management. These reflect 'bottom-up' development, resulting from sourcing decisions by private firms, although the government has played a role in providing beneficial policies (tax incentives, lack of red tape, etc.).

Scale economies are also achieved through product-specific clusters in geographic areas, primarily located in coastal cities[9] that specialise in one product and recruit sectors of the value chain to the area. Single-product industrial clusters along China's coastal regions attract related and supporting industries (yarn dealers, sewers, pressers,

packagers, and freight forwarders) and feature large, sprawling factories and dorms for workers. These investments in infrastructure and logistics lower transportation costs and speed time to market. The Chinese Government has also aided in this process by investing in the necessary infrastructure improvements in areas such as ports and roads to facilitate exports (Tewari, 2006).

Product-specific clusters first emerged in the 1970s and 1980s, led by investors from Hong Kong, Taiwan, and Macao and facilitated by the government's attractive foreign direct investment policies and incentives. Many of these export-oriented firms are located in South China (Guangdong, Fujian). The second group emerged in the 1980s and 1990s, led by Chinese investors in the Zhejiang and Jiangsu provinces (Gereffi, 2009). Both are examples of how China's government and entrepreneurs have turned scale-driven specialisation into a competitive advantage.

Alternatively Mexico has had a lack of government support with few major programmes to assist the textile and apparel sector (USITC, 2004). Lead firms desire to work with fewer, larger, and more capable suppliers that have the network to coordinate supply chains in strategic locations around the world. Mexico is not part of a global network, and is not strategically tied into the region. Many of the production operations in Central America and the Caribbean were set up by US firms as a way of preserving US textile factories and maintaining a foothold in apparel manufacturing, but low-cost competition has made these networks increasingly uncompetitive (Anson, 2010). Many of the US brand manufacturers that set-up the apparel assembly base in Mexico have shifted to a sourcing rather than manufacturing business model, and have looked to more capable suppliers in Asia.

5.5 Industrial organisation: regional integration and value chain upgrading

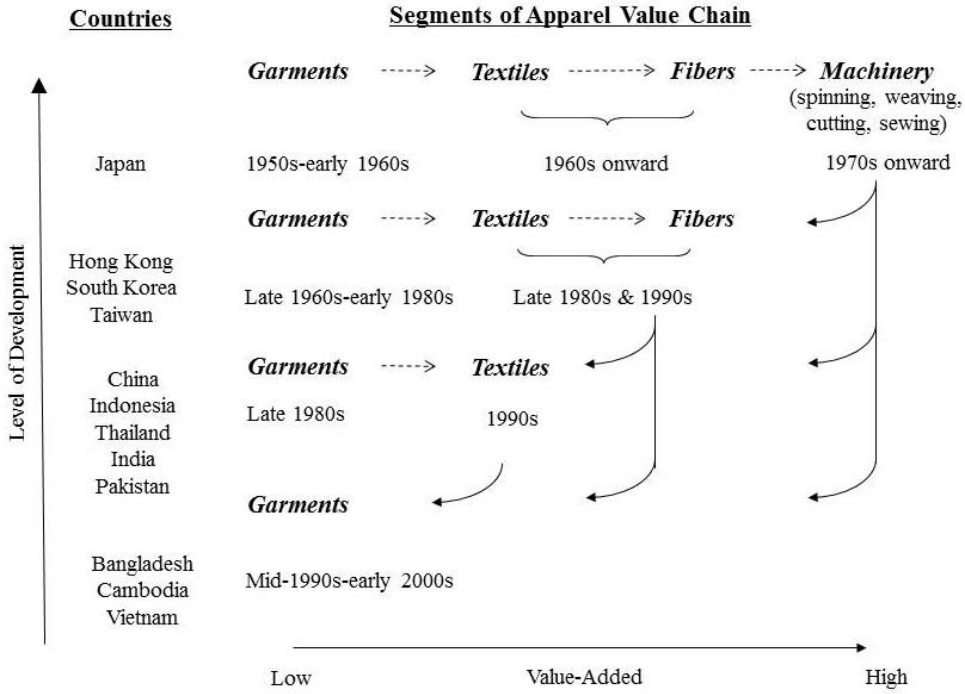
China has experienced regionally integrated development with East Asian neighbours, whereas Mexico and CAFTA have largely emerged as competitors rather than as unified apparel producing network. Regional integration has played out very differently among East Asia apparel producers and those in North America. The USA and its regional suppliers emerged as a regional production-sharing model based on tariff preference schemes (NAFTA, DR-CAFTA, the CBI agreements and the HOPE Act). Networks were created and held together by large US brand manufacturers and textile firms with a desire to keep domestic textile manufacturing in business by moving the most labour intensive parts of the apparel supply chain to nearby, low-wage countries. The East Asian division of labour is a much stronger integrated manufacturing model. The China model allows it to take much fuller advantage of strategies for moving up the value chain, and ultimately upgrading through tapping its own domestic and nearby regional markets using ODM and OBM.

5.5.1 Coordinated upgrading in Asia's regional apparel value chain

Figure 1 illustrates how the division of labour between countries at different levels of development shaped the pattern of industrial upgrading in the Asian apparel value chain. The main segments of the apparel chain – garments, textiles, fibres, and machinery – are arranged along the horizontal axis, and they reflect low to high levels of relative value-added as capital intensity increases. Countries are grouped on the vertical axis by

their relative level of development, with Japan at the top, China and India in the middle tier, and the least-developed exporters like Bangladesh, Cambodia, and Vietnam at the bottom.

Figure 1 Apparel value chain upgrading in Asia



Notes: Dotted arrows refer to the sequence of production and export capabilities within economies. Solid arrows refer to the direction of trade flows between economies. Dates refer to countries' entry years for exports of specific products.

Source: Gereffi and Frederick (2010), adapted from Gereffi (2005, p.172)

This reveals several key dynamics about the apparel value chain in Asia. First, individual countries tend to progress from low to high value-added segments of the chain in a sequential fashion over time. This shows the importance of looking at the entire constellation of value-added steps in the production process (raw materials, components, finished goods, related services, and machinery), rather than just the end product. Second, there is a regional division of labour in the apparel value chain, whereby countries at very different levels of development form a multi-tiered production hierarchy with a variety of export roles (e.g., the USA generates the product designs and large orders, Japan provides sewing machines, East Asian newly industrialising economies supply fabric, and low-wage Asian economies like China, Indonesia or Vietnam sew the apparel). Industrial upgrading occurs when countries change their roles in these export hierarchies. Finally, as economies advance, they have not exited the supply chain, but have capitalised on their knowledge of production and distribution networks and thus move to higher-value-added stages in the apparel chain (Gereffi, 2005).

5.5.2 Truncated upgrading and stagnation in the North American apparel value chain

Mexico's second largest export category to the USA, cotton knit t-shirts, provides an example of how US trade preferences have led to competition among regional suppliers rather than collaboration. Mexico's main competitors in this category were primarily other Caribbean countries from 1995 to 2005. During this time, leading export positions shifted among Jamaica, Honduras, El Salvador, Guatemala, the Dominican Republic, Haiti and most recently Peru and Nicaragua. However after the quota phase-out in 2005, Vietnam and China both emerged as rapidly growing competitors. While regional suppliers were busy taking market share from each other, Asian competitors moved into the picture, and are slowly pushing out all of the regional suppliers. Regional suppliers have mostly taken market share from each other rather than focusing on growing one country's capabilities.

In East Asia, where one country may be weak in the supply chain, a nearby country is likely to have the necessary capabilities. In Latin America, Mexico and the other Central American producers have deficiencies in many of the same areas. Production is primarily limited to basic, commodity products with low values. The region lacks full-package capabilities and workers have limited knowledge of product development, branding or marketing. Furthermore, the region lacks technical education and training institutions to develop a skilled workforce. Central American manufacturing firms are mostly involved in CMT production. Similar to Mexico, products are destined for the USA, and are primarily made of cotton. The main competitive advantages include duty-free access to the US with compliance with CAFTA-DR rules of origin, access to competitively priced cotton textiles from the USA due to cotton subsidies, and proximity.

Mexico also suffers from the decline in competitiveness across the US apparel supply chain. As a majority of Mexico's top ten US apparel products are made from cotton (58% by value in 2009), producers have benefited from low raw material cotton costs due to extensive subsidies provided to US cotton farmers. However the USA is also suffering from an institutional strategy focused on insulating producers from competition in the short-term rather than investing in long-term competitive capabilities. A recent USDA report stated that India has surpassed the USA as China's leading cotton supplier, citing India's improvements in ginning and logistics practices as enhancements that are increasing the long-term competitiveness of India's industry (Adendorff et al., 2010). Both subsidies and free trade agreements are examples of strategies that protect US firms in the short-term, but alone, do not provide long-term benefits to remain competitive.

5.6 US brand manufacturers and the development of niche capabilities by suppliers

Mexico has remained stronger in the men's apparel market than the women's market. One explanation is the shift in the main type of lead firms in the women's and to a lesser extent men's trousers market. Apparel can be divided into two main categories, national brands available at a variety of different department store retail outlets and private labels, sold exclusively through one specialty or mass merchant retailer. Mexico's trouser industry was built on national brands owned by brand manufacturers such as VF (Wrangler and Lee) and Levi's (Levi's and Dockers). However, the size of the consumer market for national brands has decreased significantly in the last decade. During

Mexico's growth stage in the 1990s, national brands made up the majority of US apparel sales. In 1993, only 25% of US apparel sales were from private label goods (Gereffi, 1997). Yet by 2009, the position of private labels and national brands switched positions. In 2009, only 16% of all wholesale apparel sales were from national brands, and 84% of apparel was distributed by small brands and private label goods with specialty retail stores as the leading apparel distribution channel (31% of sales) (S&P, 2010).

Working to Mexico's advantage, men's trousers are one of the few categories in which brand manufacturers still exist and national brands maintain a sizeable consumer base, although it is decreasing. In 2008, VF's brands accounted for 19% of the US jeans market and Levi Strauss 16%, together representing 35% of total market share (Newberry, 2009). In the early 1990s, Levi's market share alone was 31% (Gereffi, 2000). Over the last decade, Levi's has closed all of its owned manufacturing plants and has shifted to a brand marketer model, and VF is slowly shifting production to Asian countries such as Bangladesh that can produce comparable products at lower prices. Most private label brands that have emerged established souring networks in Asia rather than with regional suppliers because they did not have pre-existing relationships with US textile or apparel manufacturers.

Mexico's relationship with these US brand manufacturers is both a curse and a blessing. On one hand, it has permitted Mexico to establish long-term relationships with prominent US brands in one of the leading US apparel import categories. On the other hand, it has locked Mexico into the production of basic, mid- to low-price jeans, predominately for the men's market rather than the larger women's market whose products often sell at higher price points. In 2008, half of the US jeanswear market was for women, 27% men, and 23% children (Newberry, 2009). Furthermore, most jeans brands carry products for men, women, and children, so buyers would prefer to purchase jeans from a country capable of supplying all three.

Developing the capabilities to sell to the large and growing market for women's jeans is necessary to remain competitive. On the surface, it seems that the transition from men's to women's jeans would be relatively simple, yet the skills required to make these products are actually quite different. Two of the main differences are size and style. In most cases, regardless of the brand, the size of men's trousers is based on actual dimensions; a size 31 × 32 indicates the waist is 31 inches and the length is 32 inches. This makes it easier to standardise orders, and allows a manufacturer to make basic trousers for multiple buyers without having to change machinery settings. More so than women's jeans, men's jeans are designed to be functional rather than fashionable. The relatively basic nature of men's jeans has allowed the market to remain dominated by a handful of brands. The manufacturing process for basic jeans benefits from a high level of automation, however the lack of complexity also correlates to lower prices.

The market for trousers that are parts of uniforms (workwear or imagewear[10]) has performed better in Mexico because of the turn-around time and small orders desired by the buyers. Manufacturers in Mexico and the CAFTA region are in a good position to produce school uniforms, public safety uniforms, and military apparel due to the proximity to the USA allowing manufacturers to turn and replenish goods quickly (BMI, 2009; USITC, 2004).

Furthermore, workwear is a relatively standardised product, and is not considered by most to be 'fashion-forward'. Functionality surpasses aesthetics and design and brand names are either of little importance to cost-conscious corporate buyers or are

overshadowed by the licensed logos. VF, the parent company of leading jeans brands Lee and Wrangler, is also one of the leading manufacturers of uniforms. Uniforms are sold through VF's imagewear division and the manufacturing facilities and production networks in Mexico and Central America can be used to produce trousers for both the jeanswear and imagewear divisions.

5.7 Domestic markets and functional capabilities

China has a much larger and faster-growing domestic apparel market than Mexico. In 2003, 12,725 million units of apparel were sold in China compared to 688 million units in Mexico. By 2008, the volume nearly doubled in China to 24,003 million units with Mexico increasing to 968 million. China's total growth rate and CAGR for the 2003–2008 period were 88.6% and 13.5%, respectively, compared to Mexico's 40.7% total growth rate and 7.1% CAGR (Euromonitor, 2009a, 2009b).

China is a primary supplier to global buyers with a strong domestic market as well. Whereas the majority of Chinese apparel manufacturers still operate under the OEM export business model, an increasing number of Chinese textile and apparel manufacturers are striving to move to ODM and OBM to enhance competitiveness and seek higher profit margins in export and domestic markets (Li & Fung Research Centre, 2007). China's domestic backward linkages into the fibre, yarn, and textile segments of the chain, in addition to trim, packaging, and most components required to produce apparel, provide a solid foundation for firms to make this transition.

Chinese fashion brands started to emerge in the 1990s ranging from mid-priced fashion and casual wear brands such as Episode and Giordano through fashion-forward mid to upper range women's wear (Giordano and Exception de Mixmind), to luxury, global brands such as Shanghai Tang. Most of these Chinese brands have headquarters in Hong Kong, manufacturing in mainland China, and retail outlets in both and in other nearby Asian countries (Clark and Milberg, 2010).

Developing domestic Chinese brands has been difficult. Global brands were introduced into the Chinese market prior to local brands, and Chinese consumers have become attracted to the style and status of Western brands and fashion trends. Emerging domestic brands do not have the panache associated with Italian designers or the global marketing appeal of US brands. To overcome this, firms often pick labels with foreign rather than Chinese names to minimise local association (Clark and Milberg, 2010).

Local brands for the Chinese market have a great deal of potential as China graduates more students from its fashion design programmes, and the curriculum in those programmes becomes more similar to that of design schools in western countries. Currently there are around 300 fashion design programmes in China, producing an estimated 6,000 graduates annually. International recognition of Chinese brands will take more time, as international consumers have been trained to look to US and European countries for fashion and creative innovations (Clark and Milberg, 2010).

The domestic market is also providing an outlet for upgrading China's textile industry to serve the needs of non-apparel end-use markets. In preparation for the Olympics and in light of the recent economic crisis, China's government has been instrumental in driving this growth through significant investments in large infrastructure and construction projects that require advanced textile products, such as geotextiles or non-woven fabrics. Developing domestic capabilities in these higher-value products fulfil the need for

domestic growth, but perhaps more importantly, represent an area for export growth to emerging economies lacking a domestic textile sector.

Mexico has yet to develop a strong local market for domestic brands. One of the major weaknesses in the domestic market is a very high level of contraband and counterfeit clothing. A 2005 study suggested that 58% of all clothes sold in Mexico entered the country as contraband, largely originating in China (BMI, 2009).

Table 11 Comparison of upgrading factors in China and Mexico

Upgrading	*China*	*Mexico*
Process upgrading: investment in textile machinery: global 2000–2009 shipment ranks		
Yarn machinery: short-staple	#1	#12
Yarn machinery: open-end (2009 only)	#1	#9
Woven fabric machinery: shuttleless looms	#1	#22
Knit fabric machinery: single jersey	#1	#18
Knit fabric machinery: double jersey	#1	#19
Knit fabric machinery: hand knit	#2	#<35
Knit fabric machinery: electronic flatbed	#1	#32
Product unit costs: US imports: M&B cotton woven trousers (customs value/dozen)	\$74.5 (2009)	\$88.5 (2009)
	\$59.7 (2005)	\$92.8 (2005)
	\$98.3 (2000)	\$93.8 (2000)
	\$78.1 (1996)	\$89.8 (1996)
Product diversity: share of top ten US product exports	43.7% (2009)	73.3% (2009)
	36.8% (2005)	70.5% (2005)
	42.9% (2000)	68.9% (2000)
	45.0% (1996)	68.3% (1996)
Market diversity: concentration of top five export markets	83.6% (2009)	98.4% (2009)
	85.4% (2005)	99.4% (2005)
	89.7% (2000)	99.6% (2000)
	93.2% (1995)	99.6% (1995)
	93.1% (1992)	99.9% (1992)
Labour costs (2008)	\$1.44–\$1.88	\$2.17
Dependence on apparel exports: clothing share of total merchandise export value	8.9% (2009)	5.2% (2009)
	14.5% (2000)	1.8% (2000)
Firm capabilities	OEM and ODM	Assembly and OEM
Domestic textile production	Yes: all types	Yes: limited to basic textiles
Regionally integrated	Yes	No
Institutional/government support	Yes	Trade agreement
Domestic market		
Domestic clothing market volume (2008)	24,003 million units	968 million units
Domestic clothing market vol. growth (2003–2008)	Total: 88.6%; CAGR: 13.5%	Total: 40.7%; CAGR: 7.1%

Source: Anson and Brocklehurst (2010a, 2010b), USITC (2010), UN COMTRADE (2011), Jassin-O'Rourke Group (2008), WTO (2010), Euromonitor (2009a, 2009b)

6 Conclusions

The last five years have been filled with many new challenges in the global apparel value chain. The elimination of quotas and safeguards coincided with the economic crisis (2008–2009) resulting in a consolidation among a relatively small number of large apparel exporters, while smaller exporters were cut out of the chain. The last two years have reinforced many of the trends occurring after the phase-out of quotas. China, Bangladesh, Vietnam, and Indonesia are increasing their market shares in North America and the EU, primarily at the expense of near-sourcing options such as Mexico and the Central American and Caribbean suppliers to the USA. To highlight dynamics of the structure of global apparel production in the post-quota and crisis era, a comparison was drawn between the upgrading strategies of two large apparel exporters, China and Mexico, and their regional networks.

Mexico and the Central America region have two main competitive advantages in the apparel industry: proximity and preferential access to the US market. However, Latin American exporters have not been able to turn their geographic proximity to the US market into a lasting source of competitive advantage. This can be attributed to a lack of supplier upgrading because of lock in to assembly versus more advanced full-package capabilities; and a lack of diversification beyond the US market. Production-sharing trade arrangements with strict rules of origin often lock developing countries into low value-added activities that provide minimal opportunities for upgrading, few linkages or reasons to develop domestic input suppliers, and strong incentives to keep labour costs low.

China's government has provided an ongoing growth platform through high levels of public investment in infrastructure and workforce development. Similar to China, Mexico's policies have kept wages low, but without the level of public investment in infrastructure seen in China (Robinson, 2010). China and its East Asian neighbours have pursued a regionally integrated development strategy that has relied on China's unmatched economies of scale and scope in textile and apparel production, as well as the opportunities provided by China's large domestic market to climb the value into the higher value activities associated with ODM and OBM production.

China's advantages in terms of a more complete pattern of regional integration based on the complementary capabilities of various Asian economies has enabled it to pursue a diversified end market export strategy as well. China relies far less heavily on the US and EU15 end markets than any major other global apparel exporter, and it is now diversifying its ties with a broader range of export markets.

Mexico and Central America have some advantages of their own in terms of products and connections with lead firms in US market. Even if Mexico is losing relative market share to China, close ties to the US market are not insignificant, and these have sustained Mexico's position among the leaders for US apparel imports. However, if Mexico and the CAFTA-DR economies hope to reverse the recent decline in their shares of the US apparel import market, they may need to revamp their US-centric model of North American regional integration and diversify both input supplies and end markets to stimulate the competitiveness of local suppliers.

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Notes

1 FOB is technically an international trade term in which, for the quoted price, goods are delivered on-board a ship or to another carrier at no cost to the buyer.

2 Captive and modular production networks are part of a broader typology of governance structures in global value chains that includes five categories of governance: hierarchy (or vertical integration), captive, relational, modular, and market (see Gereffi et al., 2005). Within any particular industry, multiple forms of governance typically co-exist, and each type of governance offers different opportunities and constraints for upgrading. Within the global apparel industry, the coordination of OEM and ODM activities in buyer-driven chains is an overarching pattern that has been characterised as relational governance (Gereffi, 1999).

3 The Asia-Pacific region includes, in order from largest to smallest apparel retail markets in 2009: China, Japan, India, South Korea, Australia, Taiwan, and Singapore.

4 China's export value for 2007 was $117.3 billion (UN COMTRADE, 2011).

5 The trade policy-driven access of the CAFTA-DR and NAFTA countries to the US market for apparel is quite similar to the dynamics found in sub-Saharan Africa's apparel-exporting economies that are covered by the African Growth and Recovery Act (AGOA), such as Lesotho and Swaziland (see Morris et al., 2011).

6 Egypt and Haiti are both eligible for duty-free access subject to rule of origins provisions under the US Qualifying Industrial Zone (QIZ) Initiative (2004) and the HOPE Act (2006): Haitian Hemispheric Opportunity through Partnership for Encouragement Act.

7 NESOI indicates not elsewhere classified.

8 The two countries also competed in bras, but US imports from Mexico have steadily declined since 2000.

9 China's apparel industry has long concentrated in the coastal regions. In 2006, five provinces (Guangdong, Zhejiang, Jiangsu, Shangdong and Fujian) represented 83% of China's total apparel output (Li & Fung Research Centre, 2007).

10 Examples of imagewear buyers include the government, airlines, and major league sports teams.

Value chain dynamics, local embeddedness, and upgrading in the clothing sectors of Lesotho and Swaziland

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Abstract: This paper assesses the implications for upgrading of integration into two distinct clothing value chains in Lesotho and Swaziland – the value chain characterised by Taiwanese investment and feeding into the US market under the African Growth and Opportunity Act (AGOA) and the value chain characterised by South African investment and feeding into the South African market. These value chains differ with regard to ownership patterns, end markets, governance structures, retailers' demands, and investors' motivations. These different characteristics have crucial impacts on upgrading possibilities, including functional, process and 'local' upgrading. Thus, from the perspective of upgrading and sustainability, ownership patterns, local embeddedness and market diversification matter. The emergence of South Africa as an alternative end market and the different value chain dynamics operating in the South African retailer-governed value chain opens up new opportunities from those of the AGOA/Taiwanese-dominated value chain.

Keywords: global value chains; GVCs; foreign direct investment; FDI; market diversification; African Growth and Opportunity Act; AGOA; apparel; Sub-Saharan Africa; SSA.

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1 Introduction

Over the past decade, several Sub-Saharan African (SSA) countries have developed export-orientated clothing sectors, including Lesotho – which became the largest SSA clothing exporter to the USA – and Swaziland. This took place within a policy framework of 'export-led growth' as governments hoped that the sector would play a central role in (starting) the industrialisation process. The central dynamics making this possible were Multi-Fibre Arrangement (MFA) quota restrictions on large Asian producing countries, and the African Growth and Opportunity Act (AGOA) implemented in 2000 securing preferential market access to the USA. Foreign direct investment (FDI), primarily from Taiwanese investors, also played a central role in the growth of export-oriented clothing sectors in Lesotho and Swaziland as entrants used their global positioning to secure access and connectivity to global value chains (GVCs) feeding into US retail chains.

Consequently, Lesotho's clothing exports to the USA jumped from US$111 million in pre-AGOA 1999 to US$456 million in 2004; Swaziland's US clothing exports increased from US$23 million to US$179 million in the same time period. Over 98% of total clothing exports went to the USA in both countries. However, the phase-out of the MFA end of 2004 and the global economic crisis in 2008/2009 had severe impacts on the

clothing sectors in Lesotho and Swaziland with regard to exports, number of firms and employment. In 2005 clothing exports to the USA decreased by 14% in Lesotho and by 10% in Swaziland. After some stabilisation in 2006 and 2007, Lesotho's clothing exports to the USA decreased again by 11% and 18%, and Swaziland's by 7% and 24% in 2008 and 2009 respectively.

These aggregate figures mask however important changes taking place in the structure of the clothing sectors in Lesotho and Swaziland in recent years. The MFA phase-out and the global economic crisis triggered a change in ownership and export patterns. While several Taiwanese investors left in the context of the MFA phase-out and the global economic crisis, the remaining Taiwanese manufacturers have been joined, post 2005/2006, by a new type of investor – South African clothing manufacturers. Unlike the Taiwanese firms, these South African investors were not interested in using Lesotho and Swaziland as a production base to take advantage of AGOA preferential access. Instead their investment has been driven by the lower cost operating environment, in particular with regard to labour costs in Lesotho and Swaziland, and duty-free market access to South African retailers through the Southern African Custom Union (SACU). Thus, the relocation of these firms has resulted in the growth of a new South African export market.

The entrance of South African clothing manufacturers in Lesotho and Swaziland has resulted in the emergence of a different clothing value chain driven by South African retailers and operating under very different dynamics than the US retailer-driven value chain. The Taiwanese and South African-owned firms are therefore integrated into two distinct clothing value chains which differ with regard to governance structures and firm set up, end markets and retailers' demands, export products, investors' motivations and perceptions of main challenges, as well as their implications and potentials for upgrading. This paper assesses the characteristics of these distinct value chains and what they imply for upgrading possibilities.[1]

Upgrading is defined as moving to higher value activities in GVCs in order to increase the benefits (e.g., security, profits, skill, technology or knowledge transfer) from participating in global production (Bair and Gereffi, 2003). Upgrading is generally conceptualised in four types (Kaplinsky and Morris, 2001; Gereffi et al., 2001, 2005; Humphrey and Schmitz, 2002): process upgrading (improving technology and/or production systems), product upgrading (producing more sophisticated products), functional upgrading (taking over more functions beyond manufacturing such as design, input sourcing, distribution/logistics or branding and marketing) and chain upgrading (moving from one industry to another). In addition we add a further dimension – 'local upgrading' – derived from the level of 'embeddedness' of firms. 'Local upgrading' refers to local skill and capability development and spillovers to the local economy. This last upgrading dimension is central to assess the sustainability of clothing exporting and its impact on broader industrial development processes in FDI-dominated sectors.

The paper is structured in the following way. The first part provides an overview of the recent development of the clothing sectors in Lesotho and Swaziland and of the specific ways these countries have been integrated into clothing GVCs related to MFA quota-hopping, preferential market access, and foreign ownership. The second part identifies the two distinct value chains and assesses their different characteristics. The third part discusses what these differences imply for upgrading possibilities referring to different dimensions of upgrading – functional, process, and 'local upgrading'. The conclusion points out policy implications.

2 Development of the clothing sectors in Lesotho and Swaziland: Taiwanese and South African investors

The clothing sector has had a central role in Lesotho's and Swaziland's economy. It accounts for 18% of Lesotho's GDP, nearly 70% of total manufacturing production, the largest share in formal sector employment, and more than 90% of Lesotho's total exports (ComMark, 2009). Swaziland's economy is more diversified than Lesotho's but the clothing sector is still central – clothing exports account for around 25% of total exports and after the agriculture sector, the clothing sector provides the highest number of jobs accounting for the largest source of formal employment (Madonsela, 2006).

Lesotho's clothing sector dates from the early 1980s but actual activity was relatively minor and insignificant (Gibbon, 2003; Salm et al., 2002). Taiwanese investments occurred in the late 1980s and early 1990s, motivated by quota hopping and – as most investments involved relocations from South Africa – to take advantage of lower wages and FDI incentives and to avoid sanctions.[2] In 1994 there were six clothing factories, and by the end of the 1990s total employment accounted for 9,847 jobs. In Swaziland the clothing sector had no role before AGOA.

The clothing sector in both countries only really took off with the coming into being of AGOA. From 2000 onwards AGOA has provided quota and duty-free market access to the US market coupled with non-restrictive rules of origin (ROO) as the third country fabric (TCF) derogation allowed for single transformation for lesser developed countries (including Lesotho and Swaziland).[3] This combined with quota provision through the MFA started a growth path of clothing exports to the USA in Lesotho and Swaziland.

Lesotho is probably the most impressive example of the impact of AGOA on clothing exports in SSA. Lesotho was granted accession to AGOA in October 2000. Its clothing industry grew from 21 firms in 1999 to 49 firms in 2004 (Morris and Sedowski, 2006). Clothing exports commensurately jumped fourfold from US$111 million in 1999 to US$456 million in 2004 (Table 1) making Lesotho the largest SSA exporter of clothing to the USA with a share of 26% of total SSA US clothing exports in 2004. Nearly all of Lesotho's clothing exports went to the USA – 98% on average. Employment increased from 9,847 in 1999 to 53,087 in 2004 (Table 2).

Table 1 Lesotho's clothing exports to the USA ($m)

	1996	*1999*	*2002*	*2003*	*2004*
Total exports	65	111	321	392	456
Growth rate		11%	48%	22%	16%
US share	0.17%	0.21%	0.55%	0.62%	0.68%
	2005	*2006*	*2007*	*2008*	*2009*
Total exports	390	387	384	340	278
Growth rate	–14%	–1%	–1%	–11%	–18%
US share	0.55%	0.53%	0.51%	0.47%	0.43%

Source: USITC (2010)

Table 2 Employment and number of firms in Lesotho's clothing sector

	1999	*2000*	*2001*	*2002*	*2003*	*2004*
Employment	9,847	16,417	23,518	33,140	44,345	53,087
Nr. of firms	21					49
	2005	*2006*	*2007*	*2008*	*2009*	
Employment	40,364	45,889	47,040	45,310	38,437	
Nr. of firms	42	47	47	44		

Source: LTEA (2008), CBL (2010), Bennet (2006) and ComMark (2009)

Swaziland's clothing sector also showed an impressive development. It was granted accession to AGOA in January 2001 and total clothing exports to the USA increased from US$23 million in 1999 to US$179 million in 2004 (Table 3). Over 98% of Swaziland's clothing exports went to the USA. Employment increased from 3,000 in 2001 to 30,000 in 2004 (Madonsela, 2006; Table 4).[4]

Table 3 Swaziland's clothing exports to the USA ($m)

	1996	*1999*	*2002*	*2003*	*2004*
Total exports	12	23	89	140	179
Growth rate		44%	85%	57%	28%
US share	0.03%	0.04%	0.15%	0.22%	0.27%
	2005	*2006*	*2007*	*2008*	*2009*
Total exports	161	135	135	125	95
Growth rate	–10%	–16%	0%	–7%	–24%
US share	0.23%	0.18%	0.18%	0.17%	0.15%

Source: USITC (2010)

Table 4 Employment and number of firms in Swaziland's clothing sector

	2002	*2003*	*2004*	*2005*
Employment	28,000	29,890	30,000	14,373
Nr. of firms			30	26
	2006	*2007*	*2008*	*2009*
Employment	11,373	13,900	14,254	12,000
Nr. of firms	20	15		

Source: ComMark (2009), African Economic Outlook (2010) and Madonsela (2006)

The growth of the export clothing sector was based on FDI that in both countries came almost exclusively from Taiwanese investors who came for quota hopping and preferential market access motivations and used their existing global sourcing and merchandising networks to export to the US market. The Lesotho and Swaziland firms are cut-make-trim (CMT) operations while financing, sourcing fabrics, product development and design, logistics, merchandising and marketing are carried out in their headquarters in Taiwan. They export overwhelmingly large, bulk orders of low-complexity clothing to large US retailers. Although Lesotho and Swaziland have no

export processing zones, manufacturing has tended to agglomerate geographically. In Lesotho the Taiwanese firms are concentrated in Maseru[5], whilst in Swaziland they concentrate in Matsapha (with a few in Nhangano).

Exports, employment and number of firms reached their highest levels in 2004. The phase-out of the MFA and the consequent ability of China and other low-cost Asian clothing producer countries to export to developed country markets without being hampered by quota provisions, resulted in a major decline in clothing exports from the whole of SSA, including Lesotho and Swaziland (Kaplinsky and Morris, 2008). Apart from reduced orders from US buyers due to the MFA phase-out and the associated concentration of sourcing in Asia, there were a number of other external and internal aggravating reasons for this decline. The rapid appreciation of the South African Rand had a major impact since the Maloti and the Lilangeni are both pegged to the South African Rand on a one to one basis. Furthermore, the insecurity about the extension of the TCF derogation under AGOA in 2004 also contributed to the decline. Besides these external factors, internal factors such as relatively low productivity in Lesotho's and Swaziland's firms and infrastructural challenges played a role in the decline of the sector after 2004.

In 2005 Lesotho's clothing exports to the USA decreased by 14% (Table 1). Around eight Taiwanese factories closed in December 2004 (Bennet, 2006) and around 13,000 workers were laid off in 2005 which accounts for around one quarter of total employment (Table 2). In Swaziland, clothing exports to the USA declined by 10% in 2005 and 16% in 2006 (Table 3). The number of firms in Swaziland declined from around 30 in 2004 to approximately 20 firms in 2006[6] as several Taiwanese-owned firms left. Industry data suggest that employment fell catastrophically from 30,000 in 2004 to 14,373 in 2005 and 11,373 in 2006 (Table 4).

However, not as many firms left as had been expected and exports stabilised in 2006 in Lesotho and in 2007 in Swaziland. Reasons for this are the imposition of safeguard quotas on China's exports by the USA (and the EU), the extension of the TCF derogation to 2007 (and later to 2012), the Duty Credit Certificate Scheme (DCCS) in the context of SACU[7], as well as some government support policies post MFA. But by 2008 the downward development was again accelerated by the ending of the US safeguard quotas on China's clothing exports, and more importantly by the reduction in demand for clothing exports in the context of the global economic crisis. Overall, total US clothing imports decreased by 3.3% in 2008 and by 12% in 2009. In Lesotho, exports to the USA decreased by 11% and 18% in 2008 and 2009 respectively. However, total export data from the Central Bank of Lesotho shows an export decline of only 7.1% for 2009 (CBL, 2010). Hence, it seems that the decline in exports to the USA is compensated by exports elsewhere, i.e., to South Africa (Table 5). Employment increased in 2006 and 2007, with the recovery of exports, and stabilised at around 45,000 to 47,000 until 2009 when it fell to 38,437 (Table 2). In Swaziland, exports to the USA decreased by 7% and 24% in 2008 and 2009 respectively. Employment stabilised in 2007 and 2008 but decreased in 2009 when around 3,000 jobs were lost (Table 4).

These aggregate figures mask however important changes taking place in the structure of the clothing sectors in Lesotho and Swaziland in recent years. The MFA phase-out and the global economic crisis triggered a change in ownership and export patterns. While several Taiwanese investors left in the context of the MFA phase-out and the global economic crisis, the remaining Taiwanese manufacturers have been joined, post 2005/2006, by a new type of investor – South African clothing manufacturers. These

South African investors have been driven by largely three motivations: Firstly, taking advantage of the lower cost operating environment (labour and overhead costs) in Lesotho and Swaziland; Secondly, escaping the rigid and inflexible labour market conditions governing South African labour relations; Thirdly, gaining duty-free market access provided by Lesotho and Swaziland being members of SACU to supply retailers in the South African domestic market. The relocation of these firms has resulted in the growth of a new South African export market (Table 5).

Table 5 Lesotho's and Swaziland's clothing exports to South Africa (2005.01 to 2010.09)

	2005	*2006*	*2007*	*2008*	*2009*	*2010**
Lesotho						
HS 50-63 Rand m	7	19	34	161	299	*266*
HS 50-63 US$ m	1	3	5	19	35	*35*
HS 61-62 Rand m	6	17	6	110	239	*220*
HS 61-62 US$ m	1	2	1	13	28	*29*
Swaziland						
HS 50-63 Rand m	30	25	80	137	239	*346*
HS 50-63 US$ m	5	4	11	16	28	*46*
HS 61-62 Rand m	11	10	45	96	133	*179*
HS 61-62 US$ m	2	1	6	11	16	*24*

Notes: According to SARS the accuracy of data for 2005 and 2006 should be treated with caution. The Lesotho HS 61-62 data for 2007 does not correlate and is likely to be the result of a misclassification. *Data for 2010 includes only data for the first nine months. Thus, it is not comparable to the other years.

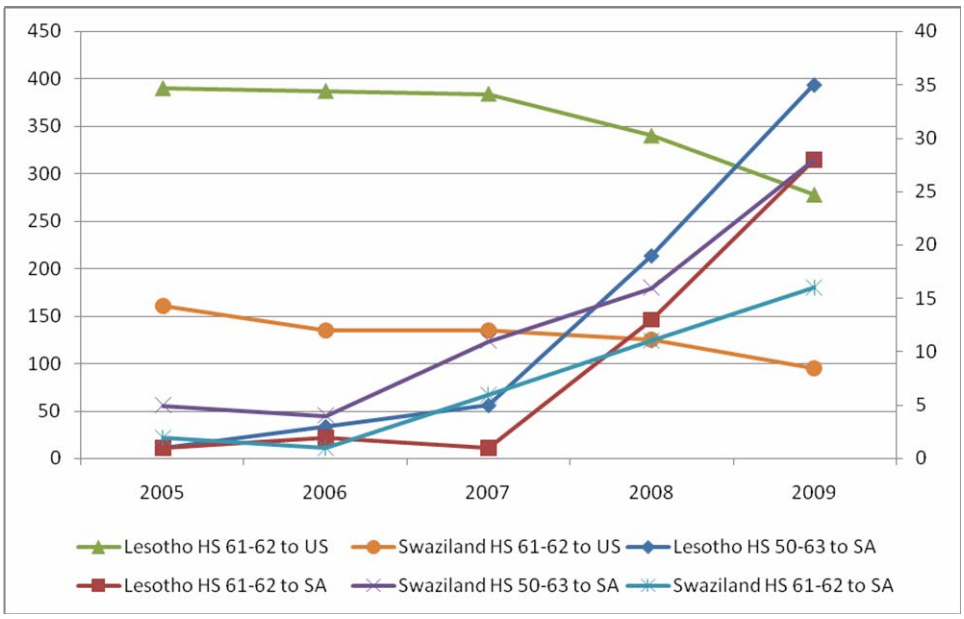
Source: SARS (2010)[8]

The rapid increase of clothing and textile exports from Lesotho and Swaziland to South Africa, starting in 2007, is extraordinary (Table 5). Between 2006 and 2009 clothing exports to South Africa from Lesotho increased 14 fold (in Rand terms from R17m to R239m) and from Swaziland 13 fold (from R10m to R133m). If one includes cotton, yarn, knit and woven fabric (HS 50-63) the increase is even more astonishing. While clothing exports to the USA from Lesotho and Swaziland declined respectively from peaks of $456m and $179m in 2004 to $278m and $95m in 2009, exports from these countries to South Africa jumped to $28m and $16m respectively by 2009. Furthermore clothing exports after three quarters of 2010 had already exceeded 2009 figures reaching $29m and $24m respectively. The shift away from a total dependence on the US market (98% in 2004) and to the South African market is apparent in Figure 1.

This market diversification is not simply explained by the MFA phase-out and competition from cheaper Asian products in the US market (Kaplinsky and Morris, 2006, 2008). Most producers in Lesotho and Swaziland who began to serve South African retailers were not necessarily previously exporting to the USA. These exports largely come from recently re-located South African firms seeking a lower cost operating environment to service South African retailers, and not from the Taiwanese-owned firms, which generally continued exporting solely to the USA. The entrenchment of this regional South African value chain was also accelerated by the South African government's policy to impose quotas on Chinese clothing imports over a two-year

period from 1 January 2007 to 31 December 2008. Although motivated by protecting domestic South African manufacturers, this policy led to import diversion as South African retailers searched for, and discovered, other sources of global clothing supply (Morris and Reed, 2009). These new sourcing countries included other Asian countries such as Bangladesh but also regional supplier countries from the Southern African region.[9] The entry of South African clothing manufacturers in Lesotho and Swaziland provides a central new dimension to the dynamics driving the clothing industries in these countries. A different value chain has been created that is driven by South African retailers requiring shorter, more flexible runs, and underpinned by South African clothing manufacturers' frustrations with operating conditions in South Africa.

Figure 1 Lesotho's and Swaziland's clothing exports to the USA and South Africa (US$) (see online version for colours)



Notes: Exports to the USA include HS 61-62 (apparel); exports to South Africa include HS 61-62 (apparel) and HS 50-63 (apparel and textile products). The US exports relate to the left scale; the South African exports to the rights scale.

Source: USITC (2010) and SARS (2010)

Notwithstanding these positive developments, Lesotho's and Swaziland's export clothing sectors remain highly vulnerable in the context of increased competitive pressures related to the MFA phase-out and the global economic crisis and cost competition that has emerged in a number of locations, most notably China, Bangladesh, Cambodia and Vietnam. At the same time the Maloti and the Lilangeni, which are pegged to the South African Rand, have appreciated in value to the US$, whilst the DCCS, which effectively subsidises exports to the tune of 14% to 25% of sales, is scheduled to phase-out in March 2011. Further, there exist infrastructural challenges in both countries as well as deficiencies with regard to skills and productivity at the firm level. These considerations raise serious questions about the sustainability of Lesotho's and Swaziland's clothing exports.

3 Two distinct value chains: characteristics of Taiwanese/USA and South African value chains

This part identifies two distinct value chains existing in Lesotho and Swaziland and assesses their different characteristics and dynamics with major implications for the characterisation as well as behaviour and activities of firms feeding into these different value chains. The US retailer and Taiwanese investor-governed value chain, on the one side, and the South African retailer and investor-governed value chain, on the other side, differ with regard to governance structure and firm set up, end markets and retailers' demands, export products, investors' motivations and perceptions on main challenges, as well as with regard to their implications and potentials for upgrading.

Using the criterion of ownership, clothing firms in Lesotho and Swaziland can be categorised into Taiwanese and South African-owned firms. An estimate of the distribution of these firms is around 60% Taiwanese and 40% South African in Lesotho, and 80% and 20% respectively in Swaziland. Besides the 'classical' Taiwanese and South African firm, there exists a third type of firm – a few Taiwanese-owned firms with more locally embedded owners. This type of firm has partly changed its firm set up and started exporting to the South African market in 2006 and more significantly in 2008 as a response to declining US orders in the context of the global economic crisis. We describe the chief characteristics of these three types of firms below in order to conceptually characterise how they fit into the dynamics driving the two value chains operative in Lesotho and Swaziland.

- *Firm type 1 (Taiwanese-owned, US market-directed):* Most Taiwanese-owned firms in Lesotho and Swaziland are owned by transnational producers based in Taiwan, as part of their triangular manufacturing networks. Local activities in Lesotho and Swaziland are limited to manufacturing while input sourcing, product development and design, merchandising and marketing, logistics and buyer relationships are located at the Taiwanese headquarters. The strategy of these firms is global – exporting almost exclusively to the US market with production plants in different regions, including SSA, Asia, Central America and the Caribbean. Local decision-making powers are minimal, with barely any local linkages as parent companies generally source inputs for all their plants globally. Even if local, quicker and more flexible, inputs are available, local managers are not empowered to make sourcing decisions. Without local sales and merchandising competencies buyers interested in sourcing from these plants are directed to Taiwan. As US orders dropped dramatically in 2008/2009, firm representatives said they could have exported to South Africa to fill capacity but parent companies were uninterested in a regional strategy, focusing on their global strategy of exporting long run, basic products to the USA. Management consists almost exclusively of foreigners: top management is mostly Taiwanese, middle management mostly (mainland) Chinese and shop floor supervisors are (mainland) Chinese, Sri Lankan and some locals. Amongst management the common language is Chinese. There is generally quite a negative attitude towards locals – problems are attributed to 'lazy workers' and 'their unproductive culture'.

- *Firm type 2 (South African-owned, South African market-directed):* South African-owned firms started investing in Lesotho and Swaziland in 2005/2006 – in Lesotho specifically because a new industrial estate was created in Maputsoe where most South African firms established greenfield plants. Their main motivation was to use low-cost labour close to their end market South Africa which they supply almost exclusively. These firms specialise in shorter run and quicker response products with higher fashion content. Most management positions are held by South Africans. Most inputs, in particular fabrics, come from Asia but some firms use regional fabrics, in particular from South Africa and Mauritius but also from Lesotho. Most firms have headquarters, sales and merchandise offices and their input sourcing, product development and design teams in South Africa, but some also have more decision-making powers and even their headquarters in Lesotho and Swaziland. These firms are not part of a global strategy but are regionally embedded as owners have their networks in South Africa with direct relationships to large South African retailers.
- *Firm type 3 (Taiwanese-owned, US and South African market-directed):* There are very few Taiwanese-owned firms in Lesotho and Swaziland not owned by transnational producers and more locally embedded. In Swaziland one Taiwanese firm is not linked to a Taiwanese parent company. The owner makes all the sourcing decisions locally and has direct relationships with buyers. Management and supervisors are mostly foreign. Currently, two managers are locals and 17 out of 40 supervisors are locals. The firm exclusively exported to the USA until some years ago, but with the ending of the MFA and the global economic crisis, the South African market now accounts for around 60% of sales. Inputs are imported from Asia, with some trims and a minimal amount of fabrics regionally sourced, and local linkages for packaging. In Lesotho one Taiwanese firm with no headquarters in Taiwan exports 90% of production to the USA and the remainder is sold in South Africa. Although not owned by a transitional producer, its driving dynamic is still embedded in a Taiwanese triangular manufacturing network. However the ownership dimension makes possible switching value chains to South African retailers although this would require substantial changes in production organisation.

These firms do not exist in isolation. Rather they survive and thrive on the basis of their insertion into particular value chains which determine who they supply to, what items they produce, how they produce them, in what quantities, and with what materials. Within these value chains 'ownership' (i.e., nationality) of supplier firms specifying the extent to which firms are domesticated and have roots in the social and economic fabric of that economy, society or region, is an important analytic criterion to understand and differentiate the behaviour and activities of these firms. However, ownership is insufficient to grasp all complexities underlying the dynamics driving supplier firms. In addition we have to factor in the governance dynamics driving the different value chains supplying the US and the South African end market.

Crucial within this, and very related to ownership, is the nature of the two main types of triangular manufacturing networks supplier firms are locked in. On the one hand, the Taiwanese networks use Lesotho and Swaziland to house their CMT operations (with all other functions centralised in Asia) to gain preferential market access to the USA. The drivers of this triangular manufacturing network are cost and policy factors with no incentive to locate more than CMT operations in Lesotho and Swaziland. On the other

hand, the South African networks supply the South African retail market. These networks are driven by an attempt to escape from the high cost and labour market rigidities characterising the South African production environment with an incentive to relocate more production functions to Lesotho and Swaziland. The dynamics related to ownership coalesce within the totality of the differing requirements and dynamics of the US and South African-based value chains where retailers in both countries govern the respective value chains. These dynamics determine the constraints and opportunities available to supplier firms and find analytic expression in the extent of their localisation - which we call embeddedness.

Using this conceptual framework the three types of firms described above can be re-classified into two analytic categories – those feeding into the US value chain through Taiwanese/Asian triangular manufacturing networks and those embedded in the more locally driven triangular manufacturing networks of the South African value chain. For easiness of nomenclature we term the former Taiwanese-owned firms and the latter South African-owned firms in the following discussion on different characteristics of these firms – notwithstanding the fact that at the margin there exist a couple of Taiwanese firms that are also somewhat more locally embedded.

3.1 Investors' motivations

The majority of the Taiwanese-owned firms in Lesotho and Swaziland were established before or around 2000/2001. However, the vast majority of South African-owned firms date from 2005/06. The investment motivation differs significantly between the Taiwanese and South African firms. The primary drivers for Taiwanese investment were MFA quota hopping coupled with preferential market access to the USA through AGOA and the TCF derogation in 2000/2001. In addition there was the availability of special incentives for foreign investment provided by Lesotho's and Swaziland's government, including (among others) subsidised factory rentals and serviced industrial sites, a low corporate tax rate, free repatriation of profits, tax exemptions on imported machinery and equipment, and full rebates on imported inputs for exporting. For the Taiwanese-owned firms the DCCS supporting exports to the USA further increased the profitability of clothing manufacturing, and, with AGOA access, was a major reason for their continued manufacture of clothing in Lesotho and Swaziland after the MFA phase-out.

In contrast, the primary drivers for South African investment were the low cost of labour, a flexible labour market, a more 'compliant' union environment relative to South Africa, and proximity to the South African market. Geographical proximity refers not only to closeness to retailers. It also enables South African clothing manufacturers to maintain capacity at head offices in South Africa but still be able to send out management expertise to deal with problems or opportunities in Lesotho and Swaziland. It allows for a fluidity of functional operations between plants which is the opposite of the highly structured, functionally separated operations of the Taiwanese firms.

The low cost of labour was an important but only secondary driver for Taiwanese investment. This is largely because their cost benchmarks are different. Taiwanese-owned firms compare labour costs to other production locations of Taiwanese transnational producers in countries such as China, Vietnam, Cambodia and Bangladesh against which Lesotho's and Swaziland's labour costs do not appear advantageous. South African-owned firms on the other hand compare costs to their production plants in South Africa.

Also the proximity to the South African market was not an important motivation for Taiwanese firms, which almost exclusively export to the USA.

3.2 Governance structure and firm set up

Ownership patterns are important as they determine how supplier firms are linked to global production and distribution networks and have crucial implications on governance structures and the set up of supplier firms. Most Taiwanese-owned firms in Lesotho and Swaziland are local affiliates of large Asian firms with their head offices in Taiwan that own or source from production units in several countries on a global scale. They follow a global strategy involving long run production for export, mostly to the USA, of a narrow range of basic products made in large plants with generally highly inflexible operating environments and specialising in a narrow range of functional activities (Gibbon, 2008). This type of integration has on the one hand led to access to global sourcing and merchandising networks and made entry into global clothing value chains possible. On the other hand it has implied a certain governance structure and firm set up as critical decision-making power and higher-value functions are located at the headquarters. The parent companies are generally in charge of input sourcing (often drawing on their own textile mills or sourcing networks based in Asia), product development and design, logistics, merchandising and marketing, and have direct relationships with buyers. Production plants in Lesotho and Swaziland are only in charge of manufacturing (CMT). Only a few Taiwanese-owned firms have invested in more capital-intensive finishing operations such as washing and embroidery and even fewer – one in Lesotho and one in Swaziland – have integrated backwards into fabric and yarn production.

South African manufacturers generally only own production plants in Lesotho or Swaziland, with their head offices – and occasionally also further production plants – in South Africa. The production plants in Lesotho and Swaziland largely perform CMT functions, whilst input sourcing, design and product development, logistics, merchandising and marketing and the direct relationship with buyers performed by their head offices. Although these crucial functions are performed in the head offices in South Africa and most management positions are filled by South Africans, these firms are more locally embedded. As South African firms do not act globally and generally do not own production plants in other countries, their plants in Lesotho and Swaziland are not as easily substitutable as are plants of transnational producers. South African retail and production networks also have a geographical advantage over Asian-based networks. The South African firms have a very different firm set up - they are generally smaller employing around 300 to 400 workers (compared to around or above 1,000 workers in Taiwanese firms), produce shorter runs and more complex products with a moderately higher fashion content supplying South African retail chains. South African retailers source most of their long run and basic products from Asia, in particular from China. However with their local South African suppliers where they can use the advantage of geographical proximity, they focus on shorter runs, a more complex mix of products, and in certain instances, higher fashion products.

The fundamental determinant of the governance structure driving the US value chain and the Taiwanese/Asian triangular manufacturing networks is the extraction of rents from a preferential market access agreement (AGOA). These firms are not escaping from the hub of their production activities in Asia where higher value adding activities in the pre- and post-production stages are located. There is no push, only a pull to use Lesotho

and Swaziland for as long as the preferential market access prevails and as long as they can keep their operating costs to a minimum. Hence, the underlying logic of this GVC's local operations is CMT production and keeping the skilled knowledge-intensive overhead to a minimum. The South African value chain and its triangular manufacturing networks on the other hand have fundamentally different drivers. South African clothing firms are pushed out of the South African operating environment by high costs and labour market rigidities, and pulled to Lesotho and Swaziland by the lower cost of operating there and the proximity of these manufacturing locations to their operations in South Africa. These South African networks aim to transfer further production as well as some higher value adding pre- and post-production functions (e.g., pattern making, fabric management, logistic coordination), from South Africa to Lesotho and Swaziland, but are hampered by a lack of skills and technical support in the local environment.

3.3 End markets and retailers' demands

The importance of end market segmentation to the USA and EU markets has been documented for Mauritius and Madagascar (Gibbon 2002, 2003; Morris and Sedowski, 2009; Kaplinsky and Wamae, 2010). Export destination also fundamentally differentiates the Taiwanese- and South African-owned firms in Lesotho and Swaziland supplying the US and the South African market. The importance of AGOA to the Taiwanese firms in maintaining exports to the USA is very clear – well over 90% of clothing manufactured in Lesotho and Swaziland by Taiwanese-owned firms is exported to the USA using AGOA preferences. The South African firms, on the other hand, are tightly linked to South African retailers, with around 95% of their clothing being exported to South Africa. They are therefore not making use of AGOA benefits and AGOA does not have a major impact on their investments. The two end markets are significantly differentiated and firms follow different strategies to access these markets and fulfil the requirements of the respective buyers. Two main factors behind these differences can be identified:

First, end market segmentation is related to cultural, political and economic history. Taiwanese-owned firms generally also own plants in other countries which had already supplied the US market before they invested in Lesotho and Swaziland. Thus, they already knew the US market, had relationships with US buyers and their global strategies were geared towards them. Furthermore, the location of most decision-making functions, in particular sales and merchandising, in Taiwan, makes establishing new relationships with South African retailers difficult. In contrast, South African-owned firms have strong ties to the South African market and have long established relationships with South African retailers.

Second and more importantly, these end markets/buyers have different demands, sourcing practices and expectations of suppliers' functions and capabilities. US buyers demand high volumes of largely basic clothing products. They emphasise the ability to produce to buyer specifications, nominate fabric and other input suppliers, mostly from Asia, and are generally not interested in suppliers' contributions to design (Gibbon, 2002, 2008). South African buyers on the other hand use their Lesotho and Swaziland plants generally for products where lead times and volume flexibility are central. Firms representatives interviewed stated that production for the South African market brings a firm set up and an overhead structure that is uncompetitive for the US market. Conversely, Taiwanese firms which are part of triangular manufacturing networks, have a

firm set up which is geared to long run basic products and exporting to the US market which is not competitive in the small run, higher fashion and more quick response business. A Taiwanese manufacturer in Lesotho explains the different requirements as follows:

> "Production for US is in large runs using same fabric, with little complexity. … Minimum order from US is 3 containers (20,000 to 30,000 pieces) whereas for South Africa it is 1,000 pieces, 20 colors. ... Small production requirements are very different from large runs. This requires multi-tasking. The productivity of workers is negatively affected by changes in production and fabric use. ..... Production changes, including fabric changes, require production set up."

3.4 Export products

There are important differences between Taiwanese- and South African-owned firms with regard to export product profile. This is related to end market segmentation. Taiwanese-owned firms generally export large order, long run, basic clothing products to the USA. Some firms have changed their products related to buyers' requirements for increased fashionability. However, these changes are largely cosmetic, involving some additional styling detail, rather than fundamental changes to the types of products being manufactured. While some South African-owned firms utilise their Lesotho and Swaziland operations to manufacture basic, higher volume clothing that does not require high levels of skill and technical expertise, most South African firms focus on shorter run products which are more time-sensitive and have a larger fashion content.

The type of products manufactured is an important indicator of complexity when comparing firms' capabilities. However the product classification data available (whether HS or SITC) is very crude and often disguises the levels of complexity. For example, a jacket that has no styling and is unshaped is much simpler to manufacture than a shaped, fitted jacket. Thus, it is necessary to be cautious in drawing conclusions with regard to manufacturing complexity and capability simply on the basis of product classification data without firm level knowledge derived from firm visits examining operational performance. Hence, we have drawn from both product classification data and firm level interviews and discussions with experts to be able to interpret the product level data.[10]

Looking at export data, Lesotho and Swaziland clothing exports to the USA are very concentrated; the top five export products (at the HS 6 digit level) accounted for 71% of total US clothing exports in Lesotho and 67% in Swaziland in 2009. Lesotho's top five clothing export products to the USA include men's woven cotton trousers (23%), cotton sweaters and pullovers (18%), women's woven cotton trousers (14%), man-made fibre sweaters and pullovers (9%), and women's knitted cotton trousers (8%). Swaziland's top five clothing export products to the USA include men's woven cotton trousers (16%), man-made fibre sweaters and pullovers (15%), women's woven cotton trousers (15%), cotton sweaters and pullovers (11%), and women's knitted cotton trousers (10%, Table 6). The top five products are identical – thus, Lesotho and Swaziland export the same top five products to the USA. For all SSA countries, three products accounted for 50% of total SSA clothing exports to the USA.[11] Exports to the USA are dominated by simple clothing products that involve relatively few operations, are relatively easily constructed and have a low level of technical difficulty, in particular trousers (jeans) and sweaters.

Table 6 Top five clothing exports to the USA (2009)

Country	*HS*	*Description*	*US$ value (million)*	*% of US clothing exports*
Lesotho	620342	Men's or boy's trousers, cotton, woven	63.3	23%
	611020	Sweaters and pullovers, cotton	49.9	18%
	620462	Women's or girl's trousers, cotton, woven	38.1	14%
	611030	Sweaters and pullovers, manmade fibres	23.7	9%
	610462	Women's or girl's trousers, cotton, knitted	22.5	8%
	Top five total			71% of US clothing exports
Swaziland	620342	Men's or boy's trousers, cotton, woven	15.0	16%
	611030	Sweaters and pullovers, manmade fibres	14.0	15%
	620462	Women's or girl's trousers, cotton, woven	14.0	15%
	611020	Sweaters and pullovers, cotton	10.8	11%
	610462	Women's or girl's trousers, cotton, knitted	9.9	10%
	Top five total			67% of US clothing exports

Source: USITC (2010)

Clothing exports to South Africa from Lesotho and Swaziland are also very concentrated; the top five export products accounted for 51% of total South African clothing exports in Lesotho and 72% in Swaziland in 2009. Lesotho's top five clothing export products to South Africa include men's woven trousers of other textile materials (17%), men's woven cotton trousers (11%), men's jackets and blazers (11%), women's woven synthetic trousers (6%), and cotton t-shirts (6%). Swaziland's top five clothing export products to South Africa include men's woven cotton trousers (28%), women's woven synthetic trousers (17%), women's blouses of other textile materials (12%), women's cotton blouses (8%), and women's cotton skirts (7%, Table 7). Two products appear in the top five list of Lesotho and Swaziland. Only one product appears in the top five export list to the USA and to South Africa for both Lesotho and Swaziland (i.e., men's woven cotton trousers) which shows that top export products differ importantly for the USA and South Africa. The top five export products from Lesotho to South Africa reveal the inclusion of 'men's jackets and blazers of other textiles materials', whilst the category 'women's cotton skirts' features for Swaziland. These are not commodity type products, with jacket and skirt assembly generally being more technical, thereby revealing a distinction with regard to complexity between US and South African clothing exports.

Table 7 Top five clothing exports to South Africa (2009)

Country	*HS*	*Description*	*Rand value (million)*	*% of SA clothing exports*
Lesotho	620349	Men's or boys' trousers, other textiles, woven	39.5	17%
	620342	Men's or boys' trousers, cotton, woven	26.0	11%
	620339	Men's or boys' jackets and blazers, other textiles	25.6	11%
	620463	Women's or girls' trousers, synthetics, woven	15.3	6%
	610910	T-shirts, cotton	14.5	6%
	Top five total			51% of SA clothing exports
Swaziland	620342	Men's or boys' trousers, cotton, woven	37.0	28%
	620463	Women's or girls' trousers, synthetics, woven	22.7	17%
	620690	Women's or girls' blouses, other textiles	15.9	12%
	620630	Women's or girls' blouses, cotton	11.3	8%
	620452	Women's or girls' skirts, cotton	9.0	7%
	Top five total			72% of SA clothing exports

Source: SARS (2010)

3.5 Perception of main challenges

Challenges for clothing exporting in Lesotho and Swaziland are diverse. However, there are distinct differences between Taiwanese- and South African-owned firms in their perception of what are the most central challenges to their export activities. Taiwanese-owned firms see policy and cost-based challenges, including the phase-out of the DCCS, the insecurity with AGOA, the strengths of the Rand, and transport, logistics and customs-related costs as the main challenges. Another important challenge is distance from raw material suppliers and buyers and associated with this lead times, in particular related to the unavailability of local or regional yarns and fabrics. Taiwanese firms import the majority of raw material from Asia which does not only lengthen firms' lead times considerably, but the cost of importing raw material over these long distances and through South African customs is high.

In strong contrast but in line with the different dynamics and retailers' demands in the value chain they are inserted in, South African firms see skill-based constraints, in particular the lack of skills at the technical and management level, as the main challenges. South African firms identified the lack of readily available skills at all levels of personnel from basic machinists, to technical, managerial and professional staff as a central challenge as they consider the local availability of these skills important to their business

model and for transferring further production to Lesotho and Swaziland. This is in contrast to the Taiwanese firms that import the vast majority of their supervisory and management skills from Asia on a contract basis as part of their low cost operating model. South African firms also noted deficiencies in the support sector (embroidery, printing, etc.), lack of access to finance, transport, logistics and customs-related costs, and lead times related to the unavailability of local and regional yarns and fabrics amongst their critical challenges.

The low level of productivity was mentioned by both groups of firms as a key factor limiting their export growth. However, the perception of South African and Taiwanese firms on wages in Lesotho and Swaziland firms differs. Whilst all Taiwanese firms indicated that the wages of their operations in Lesotho and Swaziland are higher than at their competitors overseas, all South African firms indicated the converse. As discussed above, this is largely because their cost benchmarks differ − Taiwanese firms compare labour costs to their sister firms in countries such as China, Vietnam, Cambodia and Bangladesh; South African firms to their production plants in South Africa.

4 Implications of distinct value chain characteristics for upgrading

The integration of Lesotho- and Swaziland-based clothing firms into US/Asian- and South African-based value chains has important impacts on the production processes, the technology used and the products produced in Lesotho and Swaziland. It has also crucial implications for the functions performed in those countries. In this part we focus on upgrading and innovation possibilities by assessing opportunities and challenges with regard to functional, process, and 'local upgrading'.

4.1 Functional upgrading

Upgrading possibilities and dynamics are determined by local capabilities, skills and operating environments, but also by the role certain locations have in GVCs and thus by governance structures and the strategies of lead firms in these chains. Clothing manufacturers in Lesotho and Swaziland are locked into a particular set of low value-adding assembly processes not only as a result of deficiencies in their operating environments, but as a deliberate strategy of the parent companies of the foreign-owned plants.

With regard to Taiwanese firms, the specific integration of Lesotho and Swaziland into clothing value chains through triangular manufacturing networks limits the possibility for taking over higher value-added functions as these functions are ensured by the headquarters on a global basis. In contrast to locally-owned firms, which functions transnational producers decide to locate in Lesotho and Swaziland is not only a question of local skills and capabilities. Rather, it is determined by their strategic choice of what and how to produce in their global sourcing network as the Taiwanese-owned firms are able to leverage the skills and expertise of their head offices and other production plants for value-adding activities. The primary exporting strategy for the Taiwanese-owned firms is to continue to utilise their head offices in Taiwan to market their Lesotho and Swaziland capacities; Lesotho and Swaziland are manufacturing centres for their centralised product development, design[12], fabric management, and merchandising operations in Taiwan.

Plants in Lesotho and Swaziland within South African-based value chains are also largely involved in manufacturing activities to support product development and design, fabric sourcing and merchandising functions based at the headquarters in South Africa. However, South African manufacturers are interested in relocating more production functions to Lesotho and Swaziland as they attempt to escape from the high cost and labour market rigidities characterising the South African production environment. South African investors appear to follow a displacement strategy, where their growing regional operations are intended to progressively displace their higher cost South African operations. South African firms are consequently aiming to become more embedded in Lesotho and Swaziland so as to mitigate the negative impact of their higher cost operations in South Africa, whilst also optimising their management and professional overhead being held in that country. Related to this strategy, South African-owned firms are frustrated by the inability of Lesotho and Swaziland to provide the skills and technical support to be able to transfer more of their production from South Africa.

The Taiwanese/US-based and South African-based triangular manufacturing networks are founded on different criteria of sustainability, and hence drive supplier firms into particular trajectories with respect to functional upgrading possibilities. In the case of Taiwanese firms the very reason why they set up operations in Lesotho and Swaziland and have a competitive advantage in maintaining these networks, is the very same reason why suppliers cannot (or find it very difficult to) upgrade. The dynamics of this US value chain and specifics of the Taiwanese/Asian triangular manufacturing networks lock firms in Lesotho and Swaziland into certain low-value activities with no incentives to relocate more functions to Lesotho and Swaziland. The functional upgrading challenge is not therefore simply one of creating broader capabilities, e.g., with regard to input sourcing, product development or design, and developing the associated skills required to do so, but rather fundamentally challenging the very reason for the establishment of production facilities in Lesotho and Swaziland in the first place. On the other hand, the South African value chain with the triangular manufacturing networks embedded in the region creates a certain tightness, proximity, and an incentive to relocate more production functions to Lesotho and Swaziland and maintain a flexible porous relationship between functions in South Africa and Lesotho or Swaziland.

4.2 Process upgrading

A key determinant of success for any clothing manufacturer is its ability to introduce new process technologies and work organisation strategies which raise operational performance and ensure the ongoing competitiveness of the firm. When Taiwanese and South African investors came to Lesotho and Swaziland they brought crucial knowledge and capabilities with regard to production set up and processes. However, only few firms have undertaken major process innovations after their initial investment, and if introduced mostly only involve ongoing investment in machinery.

The Lesotho and Swaziland clothing industries are perceived as relatively non-dynamic with regard to process upgrading and operational capabilities, suggesting major deficiencies in terms of absorption of new organisational technologies. Crucial issues with regard to missing process upgrading in Lesotho and Swaziland are limited access to finance for these upgrading investments and the absence of local skills. Most firms which have conducted process innovation have funded their activities internally and did not obtain assistance from any external institution. The lack of appropriate operator skills,

technical skills, and management and professional skills, can severely impact upon a firm's operational competitiveness, and technology absorption capacities. However, while the availability of local capabilities and skills as well as of a supportive operational environment, in particular with regard to access to finance, has an important impact on the possibilities for process upgrading, what and how foreign producers decide to produce in certain countries is not only related to these local factors but also to the strategic role specific countries and production plants have in these foreign-based value chains.

Although the Taiwanese firms brought relatively new technology and production processes when they came in the early 2000s, there have been very limited improvements with regard to technology used, capital investments, efficiency-enhancing production processes and skill training. Insofar as the Taiwanese firms are producing clothing products that require more complex production processes as they incorporate more detailed styling, more difficult fabrics, more intricate embroidering and an increase in trims, this process has mainly been driven by buyers' demands rather than by the firms themselves. The quality checking process is mostly dependent on external auditing because the local representative of the US buyer checks the quality of the products on site before the shipment takes place. In short, Taiwanese firms work largely off the basic assumption that worker costs and speed are the most critical components of competitive production and there is very limited awareness of alternative methods and philosophies of manufacturing.

Most South African firms are focusing on products which require shorter runs, quicker response and higher fashion content. For these products, besides costs, production flexibility and higher, more versatile skills are important. Furthermore shorter production runs necessitate reducing time lost in line changes, as extended change over times reduces labour productivity. In addition shorter lead times associated with higher product variety requires building in quality at source, because there is no time to check quality at the end of the line and engage in substantial reworking of the product. Hence dynamics in the South African-based value chain are pushing firms to upgrade their operational efficiency which involves a focus on achieving process upgrading. It is not surprising therefore that some of these plants exhibit a very different approach to process upgrading which focuses on operational performance and not just acquisition of new technology. Hence there has been more and is a greater potential for further process upgrading in the South African clothing value chain.

The available survey data on Lesotho (Barnes and Morris, 2010) provides some evidence to support this. The measurement of inventory provides a good proxy for the measure of cost control at manufacturing firms. Firms with good inventory control are usually in control of their manufacturing costs. This is especially the case with respect to work in progress inventory, since this remains under the direct control of the plant, whereas raw material inventory (fabric) and finished goods stock lie outside the control of CMT operations and the costs of such inventory holding are not usually born by these firms. The Taiwanese-owned firms are organised functionally, with cutting, assembly, quality control, finishing, and packaging generally planned in weekly cycles, and with large lots of work in progress passed from one functional area to the next over the course of the production cycle. Barnes and Morris (2010) report that the Taiwanese-owned firms' average work in progress inventory holding (at 24.4 days) is three times the South African-owned firms (at 7.2 days) revealing the long-production run focus of their operations, as well as the batch oriented manner in which the former plants are organised.

This is consistent with commodity-based clothing production exhibiting characteristics of inflexible long runs.

This is also reflected in the relative internal flexibility – production time lost when plants shift from making one type of clothing style to another - of these two groups of firms. Despite having much longer production runs relative to their South African-owned counterparts in Lesotho, the Taiwanese-owned firms lose more of their production capacity to style changeovers (7.5% versus 7.1%). Based on the fact that the Taiwanese-owned firms manufacture more basic, and higher volume orders, their changeover time losses should be substantially lower than the South African firms. This indicates that there is a high level of operational inflexibility amongst Taiwanese firms.

Although no survey comparing operational performance has been undertaken of Swaziland firms, a number of plant visits by industry experts allows for some anecdotal evidence corroborating the difference between Taiwanese- and South African-owned firms. The Taiwanese firms in Swaziland are very similar to those in Lesotho in factory organisation and operation. However one of the larger plants in Swaziland is owned by a South African clothing firm. Although it does work for its parent firm which supplies fabric and design, its modus operandi makes it more than a simple CMT operation. In terms of its production organisation, factory layout, line organisation, machinery, and general plant environment, it compares very well with some of the best Cape Town firms that have adopted world class manufacturing practices. Furthermore, although it receives its product orders via the South African parent company, it has a well developed and sophisticated packing and distribution division which supplies South African stores directly according to their packaging and labelling requirements.

4.3 Local upgrading

When Taiwanese firms came to Lesotho and Swaziland there were no local technological and management skills available. Instead of investing in local skills which was not in accordance with their global cost containment strategy they imported technological and management skills on a contract basis from China, Bangladesh, Sri Lanka, the Philippines, South Africa, and Mauritius. Even today nearly all technical, management and even supervisory positions are filled with expatriates. The short term cost advantage the Taiwanese-owned firms generate from operating this human resources model is to the detriment of creating demand for the development of higher level skills within the local clothing industry.

In contrast, although South African-owned firms also employ a high number of foreign nationals (mostly from South Africa), they have supervisors as well as a number of managers in both lower and senior management positions who are Lesotho and Swazi citizens. For South African firms local skills is a necessary condition for the transfer of further production functions from their South African to their Lesotho and Swaziland operations. As workers become multi-skilled, technical deficiencies resolved, labour attrition stabilised, and supervisory and middle management skills created, these operations become more valuable to their overall South African market strategy. This different strategy of South African firms can be confirmed by investment in training. Although, all firms in Lesotho and Swaziland – Taiwanese and South African ones – have relatively low levels of training investment, the Taiwanese-owned firms' training investment is particularly weak.

Thus, there exist different local upgrading prospects with regard to Taiwanese- and South African-owned firms related to the different value chains in which the two sets of firms operate. While the Taiwanese global exporting strategy is based on limited skills and largely low cost machinist workers producing long run and basic products, an important part of the South African-owned firms already produces and is interested in producing more technical complex, fashionable and quick response clothing products in Lesotho and Swaziland and aims to transfer more production functions to plants in these countries. This type of production and business model requires higher local skills and capabilities. In contrast, the Taiwanese-owned firms' business model relegates technology absorption to a lower level of importance relative to that of controlling costs. Hence the integration of Lesotho- and Swaziland-based clothing firms into Taiwanese/US- and South African-based value chains has important impacts on embedding, in particular on the location of decision-making power, on local skills, capabilities and spillovers, as well as on the sustainability of operations.

5 Conclusions

The existence of two distinct GVCs driving differently-owned production plants in Lesotho and Swaziland, expressed in the concept of embeddedness, has major implications for the upgrading and innovation prospects of the clothing industry in these countries. The distinctive nature of the value chain in which the Taiwanese-owned firms operate relative to their South African-owned counterparts appears to be the major reason for the limited levels of technology absorption and skill development within the Lesotho and Swaziland clothing industry. AGOA created FDI and trade to the USA that made the Taiwanese-owned Lesotho and Swaziland clothing industry viable and grow. These firms are involved in CMT production in support of well-established, higher value adding facilities located elsewhere, and manufacture commodity clothing ranges, engaging in no serious training, and little innovation.

The proximity of the South African market, the existence of well-developed and highly concentrated retail chains, and the disadvantageous operating environment for clothing manufacturers in South Africa, has resulted in the growth of a new set of firms in Lesotho and Swaziland driven by the South African-based value chain. This latter value chain exhibits different characteristics. It is not dominated by long and basic production runs; rather its competitive advantage lies in the flexibility dictated by close geographical proximity to its major market, and the lower (labour) costs in Lesotho and Swaziland. Hence there is a greater potential for process and functional upgrading and technology transfer and absorption in these plants, in particular as South African firms are interested in transferring more production functions from their South African plants. As the South African-owned firms take skill and capability development more seriously, they are frustrated by a different set of operating issues to the Taiwanese-owned firms whose local existence is determined by policy-based factors and are almost solely focused on cost containment as their major challenge.

The upgrading possibilities evident amongst South African-owned firms in Lesotho and Swaziland are driven as strongly by push factors associated with their production facilities in South Africa, as they are by pull factors associated with production in either Lesotho or Swaziland. South African investors appear to be following a regional displacement strategy. The South African operations are consequently aiming to become

more embedded in Lesotho and Swaziland and to use their managers and professional staff in both their South African and Lesotho or Swaziland operations, thereby rendering their overall business model and cost base more effective. This strategy is not open to Taiwanese-owned firms, firstly because the nature of their triangular manufacturing base precludes such a close relationship between head office and production plants, and secondly because there are no push factors associated with the establishment of plants in Lesotho and Swaziland. There is no strategic reason beyond the ongoing accumulation of AGOA trade rents for being located in Lesotho and Swaziland. This stunts the need for local embeddedness and investments in upgrading.

Whether the South African firms actually take advantage of the potential thrown up by this value chain is the challenge facing the Lesotho and Swaziland industry and government. There is only so much local upgrading and capability and skill development that is likely to emanate from the dynamics driving the South African-based value chain. Fundamentally the upgrading and innovation challenge is one of appropriately directed and capacitated industrial policy, with the dual aim of expanding the base of their skilled labour and management pool, and fostering a culture to raise the operational competitive levels of their manufacturing operations. With regard to the localisation of skills, there is a need for the incentivisation of skill development within clothing manufacturers. Unless this is done the benefits of the clothing industry in Lesotho and Swaziland will be limited to its direct employment creation, rather than its ability to generate technology spillovers, greater levels of upgrading and technology absorption that support the industrialisation of the Lesotho and Swaziland economy on a broader front. For those firms supplying into the South Africa market, this appears to be a particularly important challenge and opportunity, one which the Lesotho and Swaziland government could secure major benefit from supporting.

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Notes

1 This paper is based on a diverse set of primary and secondary data. It utilises trade and national sector data, and draws on a number of published and unpublished firm level surveys, qualitative interviews undertaken in 2008 and 2009 by different researchers, and information from experts and key informants from relevant industry associations. The key pieces of primary research which this paper draws from is Staritz (2011) and Barnes and Morris (2010).

2 Investments were also politically motivated as Lesotho and Swaziland are part of the few countries that politically recognise Taiwan. Hence, in Taiwan investments in Lesotho and Swaziland were encouraged by offering investors incentive packages.

3 AGOA ROO normally stipulate a triple transformation (raw material to yarn to fabrics to clothing which involves spinning, weaving/knitting and sewing). However, a special rule applies to lesser developed countries allowing them duty-free access for clothing made from fabrics originating anywhere in the world. This TCF derogation was initially granted until September 2004 but then extended twice to September 2007 and September 2012. Nearly all clothing exported from Lesotho and Swaziland via AGOA preferences uses the TCF derogation.

4 Employment data for Lesotho and Swaziland should be treated with caution. The Lesotho data until 2008 is reliable – having been diligently collected on a firm by firm basis by the DFID/ComMark representative Mark Bennett until his departure in 2008. The Swaziland data is much less reliable as is clear from the misalignment between export trends and corresponding employment trends on a year to year basis. The number of firms data for Lesotho and Swaziland are based on estimates by informed observers.

5 South African firms are concentrated in Maputsoe in Lesotho.

6 There exist varying estimates with regard to number of firms in Swaziland; a main factor for the different numbers might be that some estimates count Tex-Ray with its seven factories as one and some as seven firms.

7 Many firms in Lesotho and Swaziland indicated in firm-level interviews that the DCCS was crucial for their survival post-MFA. The DCCS is a rebate of 25% on the duty to be paid on imports of textile and clothing products based on the value of goods exported outside of SACU. It was introduced in the mid 1990s and will be fully phased out in March 2011. In the interim its benefit levels have steeply eroded. Only a minority of DCCS were used for own account fabric imports. Most were sold to South African retailers using them for clothing imports. The regulation changed in 2006 to only allow reselling to other manufacturers, reducing the price of DCCS from around 80% to around 50% of the face value. In March 2009 the traded value declined further as it was restricted to imported inputs of seven product lines of yarns and fabrics.

8 SARS publishes trade data for SACU but not disaggregated for the SACU member countries. Data was provided personally to the authors.

9 Besides Lesotho and Swaziland, similar value chains to the South African market have emerged from Madagascar and Mauritius, which used to only serve the US and the EU market.

10 Justin Barnes and Rob Stewart from Benchmarking and Manufacturing Analysts undertook a number of firm level visits measuring operational performance of selected firms in Lesotho and Swaziland.

11 Including women's woven cotton trousers (22%), cotton sweaters and pullovers (14%) and men's woven cotton trousers (13%).

12 Interviews undertaken by Rob Stewart in 2008 with a selection of firms in Lesotho and Swaziland suggest that virtually all clothing products exported by Taiwanese firms in Lesotho and Swaziland were designed by US retailers or Taiwanese parent companies rather than the firms themselves.

Global value chains in the electronics industry: characteristics, crisis, and upgrading opportunities for firms from developing countries

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Abstract: In this paper, we apply global value chain (GVC) analysis to study recent trends in the global electronic hardware industry and their implications for upgrading opportunities for firms from developing countries. We identify three key firm level actors – lead firms, contract manufacturers, and platform leaders. Company, cluster, and country case studies are presented to illustrate how supplier capabilities in various places have developed in the context of electronics GVCs. The findings identify some of the persistent limits to upgrading experienced by even the most successful firms in the developing world. Four models used by developing country firms to overcome these limitations are presented: emerging multinationals, contract manufacturer spinoffs, platform brands and emerging factory-less start-ups. Each of these new models has been enabled, to a greater or lesser degree, by the rise of new markets and new kinds of consumers in developing countries.

Keywords: value chain modularity; offshoring; outsourcing; globalisation; China; Taiwan; Mexico.

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1 Introduction[1]

The electronics hardware industry is the world's most important goods-producing sector. Not only does it employ more workers and generate greater revenue than any other manufacturing sector, its products also enhance productivity in other activities and stimulate innovation across entire economies (Mann and Kirkegaard, 2006). It is a classic example of what Hirschman (1958) calls a 'propulsive sector'. Consider the case of the USA, where innovation in electronics hardware, which employed 1,105,900 in 2009, has helped spawn a host of downstream service industries, including computer systems design services, telecommunications, as well as data processing, hosting, and related information services, which together employed 2,697,200[2]. The heavy use of computers and information technology in other sectors, including retail and wholesale trade, transportation, finance, real estate, education, professional services, and industrial production, make it clear how pervasive the changes made by electronic hardware have been.

The goal of this paper is to delineate the central characteristics of global value chains (GVCs) in the electronics hardware sector, describe the incorporation of newly developed and developing countries, and the rise of new producers and consumer markets in the developing world, and discuss how they have been affected by the 2008–2009 economic crisis. As is common in GVC analysis, we identify the key actors in the chain of value-added activities, where various activities are located geographically, and how information and knowledge flow within the chain. This paper first outlines the electronics industry's central role in the rise of GVC, especially the dramatic shift of production to Mainland China, and then discusses the effects of the recent economic crisis on the industry. The paper then identifies three key firm-level actors: lead firms, contract manufacturers, and platform leaders, and discuss their development, or 'co-evolution' over time. A series of company, cluster, and country case studies are then presented to illustrate how supplier capabilities in various places have developed in the context of electronics GVCs. The final substantive section identifies some of the persistent limits to upgrading experienced by even the most successful firms in the developing world. Four models used by developing country firms to overcome these limitations are then presented:

1 global expansion though acquisition of declining brands (emerging multinationals)

2 separation of branded product divisions from contract manufacturing divisions (contract manufacturer spinoffs)

3 successful mixing of contract manufacturing and branded products (platform brands) for contractors with customers not in the electronic hardware business

4 the founding of factory-less product firms that rely on GVCs for a range of inputs, including production.

Each of these new models has been enabled, to a greater or lesser degree, but the rise of new markets and new kinds of consumers in developing countries.

Some of the material suggests that the 2008–2009 economic crisis presented a window of opportunity for developing country firms in the electronics GVCs, in particular, for firms based in Taiwan (China). The conclusion states the case that firms in the developing world will, in one or all of the ways described, soon come to play a more central role in driving the innovative trajectory of the industry by leveraging the full complement resources that have become available in GVCs.

2 The electronics industry's central role in the rise of GVCs

Each year, the electronics industry generates a mushrooming array of products and services. Now deeply entwined in our social fabric, electronics products and systems support critical aspects of communication, education, finance, recreation, and government. Thousands of companies from dozens of countries contribute to the industry on a daily basis. Even a single product can contain work carried out by dozens of firms in multiple countries. Because there is less need for co-location of engineers than in other technology-intensive sectors, such as with the co-location of design with manufacturing, it is relatively easy for electronics firms to engage in the twin strategies of outsourcing and offshoring. Global sourcing is common. Factories can be relocated with relative ease and produce a wide variety of end products. As a result, GVCs in the electronics industry are more geographically extensive and dynamic than in any other goods-producing sector.

Evidence of the importance of the electronics industry in the rise of GVC can be found in statistics on intermediate goods trade. Trade in intermediate goods is indicative of GVCs because fragmented production processes require that parts, components, and partially manufactured subassemblies cross borders – sometimes more than once – before finished goods are shipped to final markets (Feenstra, 1998; Dean et al., 2007; Brülhart, 2008). As Sturgeon and Memedovic (Forthcoming) show, the share of total manufactured intermediate goods trade accounted for by the electronics industry increased from 11.5% in 1988 to 20.3% in 2006. This suggests that the electronics industry accounts for a growing share of intermediate goods trade and, by extension, GVC formation.

In the past 20 years, East Asia in general and China in particular have become increasingly important in electronics as well as other industries, both as production locations and final markets. This is also reflected in the flow of intermediate goods. As Table 1 shows, 'greater China' (Mainland China, Hong Kong, and Taiwan) account for 35.5% of world intermediate electronics exports, up from 6.2% in 1991. Exports of electronics intermediates from Mainland China have grown extraordinarily, from less

than one percent of the world's total in 1991 to 15% in 2008. Much of this growth has come at the expense of the USA, Japan, and the UK, which ranked Numbers 1, 2, and 4 in the world in 1991; and Numbers 5, 4, and 14 in 2008.

Table 1 Top-15 intermediate goods exporters in the electronics industry, 2008 and 1991

Exporter	*World rank 2008*	*Export value 2008 ($M)*	*% of world intermediate electronics exports 2008*	*World rank 1991*	*% of world intermediate electronics exports 1991*
China	1	88,872	15.0%	26	0.3%
China (Taiwan)	2	63,755	10.8%	9	3.8%
China (Hong Kong)	3	57,651	9.7%	13	2.1%
Japan	4	46,609	7.9%	2	19.1%
USA	5	46,336	7.8%	1	20.4%
Singapore	6	39,402	6.7%	5	5.2%
Germany	7	39,113	6.6%	3	8.8%
Republic of Korea	8	37,626	6.4%	6	4.8%
Malaysia	9	28,479	4.8%	8	4.0%
Philippines	10	18,811	3.2%	18	1.0%
Netherlands	11	15,474	2.6%	12	2.8%
France	12	11,875	2.0%	7	4.6%
UK	13	11,317	1.9%	4	5.7%
Thailand	14	8,588	1.5%	15	1.6%
Mexico	15	7,791	1.3%	28	0.2%

Note: To identify commodities as consumption, capital, and intermediate goods, the conversion table broad economic category (BEC) to SITC Rev. 1 from world integrated trade solution (WITS) was used.

Source: UN comtrade standard international trade classification (SITC) Rev. 1 data.

3 Effects of the economic crisis on electronics GVCs

As with almost all other sectors, the electronics industry was deeply affected by the economic crisis of 2008–2009, mainly in terms of a steep and sudden drop in demand. Nevertheless, despite the trauma of the most recent down cycle, the global electronics industry is too globally integrated to have invited protectionist moves by policymakers. Moreover, existing trade restrictions tended to be quite lax, providing few levers for action. This is because electronic hardware and systems are rightly perceived as having a 'propulsive' effect on other industries, and because deep expertise has tended to be concentrated in only a few places (for example, in Silicon Valley, California, and in large firms based in the USA, Europe, and Japan). As a result, politicians and policy makers have been loath to put too much pressure on firms to produce locally or to put up barriers to trade, even during economic crises. Intense competition, at first between American and Japanese producers, along with a series of boom and bust cycles driven by forces both internal and external to the industry (Brown and Linden, 2009), are what pushed early

fragmentation of electronics GVCs, rather than trade barriers and local content rules alone. Producing electronic hardware in low-cost locations lowers prices, which speeds adoption of information technologies at home and leads to productivity spillovers (Mann and Kirkegaard, 2006). Because trade barriers have been minimal in this industry worldwide, the main impact of the 2008–2009 economic crisis has been to sharply reduce demand, driving the full absorption of operating inventories and accelerating existing trends toward consolidation and shifts to low-cost production geographies discussed throughout this paper. However, the crisis may have hastened the longstanding but more gradual trends of consolidation and supplier learning and GVC upgrading as well.

4 Lead firms, contract manufacturers, and platform leaders in electronics GVCs

In the electronics industry's hardware 'ecosystem' there are three principal actors: lead firms, contract manufacturers, and platform leaders. Of course, dozens of other entities play important roles in the broader industry, including software vendors, production equipment manufacturers, distributors, and producers of more generic components and subsystems. Nevertheless, an analysis of how these three firm-level actors interact in the industry's GVCs provides a useful if simplified portrait of the global electronics industry. The value captured by the most powerful firms in GVCs – lead firms with global brands and component suppliers with strong positions of 'platform leadership' – can be extremely high.

4.1 Lead firms

Lead firms in GVCs carry brands and sell branded products and systems in final markets to individual consumers, other businesses, or government agencies. These firms initiate, or 'lead', the GVC's activities by placing orders with suppliers, giving them market power over suppliers. This 'buyer power' is earned, if not by technological leadership and large investments in brand development, then by the financial risk taken on between placing orders and selling products[3]. Of course, the size of orders matters. Large orders in the supply base are driven by the expectation of large sales in end markets, and this connects lead firm power derived from market performance to their buyer power in GVCs.

Because the electronics industry has diversified as it has grown, lead firms compete in a widening array of end markets. Table 2, showing nine major end markets, reveals the remarkable breadth of the electronics industry. Each product example in the second column represents a significant and diverse market in its own right, with dozens of competitors. Examples of important firms are listed in the third column, but there are many more companies, large and small, competing in each of these markets and detailed product segments. Table 2 is necessarily incomplete and misleadingly static. Applications for electronics technology have grown almost too numerous to list, with new companies formed and new products introduced almost daily. Moreover, many of these market segments contain companies that resell hardware products by integrating them into larger systems, adding software and offering after-sales services that tailor the systems for use in specific situations and settings[4]. The electronics and wider information technology 'ecosystem', therefore, is vast.

Table 2 Main electronics markets, products, and lead firms

Main market segments		*Product examples*	*Lead firm examples*
1	Computers	Enterprise computing systems, PCs (desktop, notebook, netbook), embedded computers	IBM, Fujitsu, Siemens, Hewlett-Packard, Dell, Apple, Acer, Lenovo
2	Computer peripherals and other office equipment	Printers, fax machines, copiers, scanners	Hewlett-Packard, Xerox, Epson, Kodak, Cannon, Lexmark, Acer, Fujitsu, Sharp
3	Consumer electronics	Game consoles, television, home audio and video, portable audio and video, mobile phone handsets, musical equipment, toys	Toshiba, NEC, Vizio, Sony, Sharp Apple, Nintendo, Microsoft, Samsung, LG, NEC, Matsushita, Hitachi, Microsoft, HTC, Philips
4	Server and storage devices	Portable, internal, external, backup systems, storage services	Toshiba, Western Digital, EMC, NetApp, Hewlett-Packard, Hitachi, Seagate, Maxtor, LeCie, Quantum
5	Networking	Public telecommunications, private communications networks, internet, mobile phone infrastructure	Alcatel, Nortel, Cisco, Motorola, Juniper, Huawei, Ericsson, Nokia, Tellabs
6	Automotive electronics	Entertainment, communication, vehicle control (braking, acceleration, traction, suspension), vehicle navigation	TomTom, Garmin, Clarion, Toyota, General Motors, Renault, Bosch, Siemens
7	Medical electronics	Consumer medical, diagnostics and testing, imaging, telemedicine, meters and monitoring, implants, fitness	General Electric, Philips, Medtronic, Varian
8	Industrial electronics	Security and surveillance, factory automation, building automation, military systems, aircraft, aerospace, banking and ATM, transportation	Diebold, Siemens, Rockwell, Philips, Omron, Dover
9	Military and aerospace electronics	Ground combat systems, aircraft, sea-based systems, eavesdropping and surveillance, satellites, missile guidance and intercept	L-3 Communications, Lockheed Martin, Boeing, BAE Systems, Northrop Grumman, General Dynamics, EADS, L-3 Communications, Finmeccanica, United Technologies

Source: Authors

As the nationalities of the well-known firms listed in Table 2 suggest, most important lead firms in the electronics industry are based in industrialised countries, especially the USA, Western Europe, and Japan. Of newly industrialised countries, the Republic of Korea (hereafter, 'Korea') stands out as a base of important lead firms, especially Samsung and LG. Because of their role as production platforms and contract manufacturing centres, only a handful of important lead firms have emerged from

developing countries, including Acer, a PC company based in Taiwan; Huawei, a Chinese manufacturer of networking equipment; and Lenovo, a Chinese PC company that leapt onto the world stage with the acquisition of IBM's PC division in 2004. Later in the paper we discuss the possibility that lead firms from developing countries are finding new ways to compete successfully in global markets, and that the recent economic crisis has provided lead firms based in Taiwan with new opportunities to move into more important roles as lead firms in the electronics industry.

4.2 Contract manufacturers

Contract manufacturers make products for lead firms and sometimes provide design services as well. The popularity of contract manufacturing in the electronics industry is a direct result of value chain modularity, which enables a clear technical division of labour between design and manufacturing at multiple points in the value chain, most notably between the design and assembly of final products and the design and fabrication of integrated circuits, or ICs. At the product level, some lead firms still assemble products in their own factories, but the use of contract manufacturers has been a strong trend since the late 1980s. Production services alone – comprising component purchasing, circuit board assembly, final assembly, and testing – are referred to in the industry as electronics manufacturing services (EMS). Historically, the largest EMS contract manufacturing firms have been based in the USA and Canada (see Table 3); for example, Celestica was spun off from IBM in 1997. These firms tend to have global operations and produce for lead firms in most product segments listed in Table 2. In recent years, Foxconn (Hon Hai), based in Taiwan but with very large production facilities in China, Vietnam, and the Czech Republic, has emerged as the industry's largest player, in part on the basis of huge orders received from Apple for the production of the iPod and iPhone product lines. A number of firms based in Singapore have also risen in the EMS ranks, including Venture and Beyonics, ranked 7th and 12th in the world, respectively, in 2009.

Manufacturing plus product design services are known collectively as original design manufacturing (ODM) services. Most large ODM contract manufacturers are based in Taiwan, with manufacturing now concentrated in China. These firms (top of Table 3), have historically focused on producing for lead firms in the personal computer (PC) industry. Because manufacturing process technology, especially at the circuit board level, is quite generic, EMS contract manufacturers can aggregate business from lead firms in many electronics subsectors. Design expertise is far less generic, however, which explains why ODM contract manufacturers have historically been confined to the PC industry (Sturgeon and Lee, 2005).

It has proven to be a powerful combination for US-based 'global' EMS contract manufacturers to have facilities both at home, to work out the manufacturing details of new product designs in collaboration with lead firm design groups, as well as abroad, to perform high-volume production in locations with lower costs and proximity to promising new markets. In some cases, the offshore affiliates of these large suppliers have challenged developing country contract manufacturers on their home turf. In other cases, a complementary pattern emerged where global suppliers rely on 'second tier' developing country suppliers for components, services, and as subcontractors. A third pattern is for developed country suppliers to specialise in products and services that require the initial co-location described above.

Table 3 Top-five electronics contract manufacturers in different regions, 2009

Top-five contract manufacturers	*Primary service*	*2009 revenue (US$, millions)*
Taiwan, China		
Foxconn/Hon Hai	EMS	44,065
Quanta Computer	ODM	23,265
Compal Electronics	ODM	19,424
Wistron	ODM	16,226
Inventec	ODM	12,349
North America		
Flextronics (USA and Singapore)	EMS	30,949
Jabil Circuit (USA)	EMS	11,685
Celestica (Canada)	EMS	6,092
Sanmina-SCI (USA)	EMS	5,177
Benchmark Electronics (USA)	EMS	2,089
Other locations		
Venture (Singapore)	EMS	2.428
Elcoteq (Luxembourg)	EMS	2,090
SIIX (Japan)	EMS	1,360
Beyonics (Singapore)	EMS	1,120
Zollner Elektronik (Germany)	EMS	970

Notes: EMS – electronic manufacturing services; ODM – original design manufacturing (services)

Source: Digitimes (Taiwan, China) and company annual reports

Despite these differences, both the EMS and ODM contract manufacturing segments have been characterised by rapid growth and geographic expansion, making them key actors in electronics GVCs. Because of this rapid expansion, they now purchase the bulk of the world's electronic components, albeit on behalf of their lead firm customers. Even with large market shares in specific product segments (for example, Taiwanese ODM contract manufacturers produce more than 90% of the world's notebook computers), their market power (and profitability) has generally remained low because they are highly substitutable. In fact, the electronics contract manufacturing sector has long been characterised by intense competition, low profitability, and dramatic consolidation, even as it has experienced rapid growth. Most recently, revenues of ODM contract manufacturers based in Taiwan have surged ahead of EMS contractors. Because of their expertise in small form factor (that is, portable) product design, ODMs have been able to capture the lion's share of new business for burgeoning product categories like portable computers, smart phones, and navigation devices.

Whatever the competitive battles and complementarities that have emerged among developed and developing country suppliers, the most important change is that increasing supplier capability is allowing lead firms to implement global production strategies in ways that were unimagined 20 years ago. Sustained efforts by the largest lead firms to expand and consolidate their sourcing networks have helped to create a new class of huge globally operating suppliers in the electronics industry, and supplier consolidation has

meant that there are larger, more capable suppliers to choose from. Suppliers have collected bundles of capabilities and can now provide one-stop shopping for lead firms seeking regional and global supply solutions. This new class of global supplier has internalised many of the most difficult and costly aspects of cross-border integration such as logistics, inventory management, and the day-to-day management of factories (Sturgeon and Lester, 2004).

4.3 Platform leaders

In some industries, such as PCs, mobile phones, and a few industries unrelated to electronics such as bicycles, platform leaders play a crucial role (Galvin and Morkel, 2001; Fixson and Park, 2008). Platform leaders are companies that have been successful in implanting their technology (in the form of software, hardware, or combination) in the products of other companies (Gawer and Cusumano, 2002). In extreme cases, platform leaders can capture the bulk of industry profits and retain tight control over the innovative trajectory of the industry. In the electronics industry, the notebook PC and mobile phone handset cases show why the term 'lead firm' does not necessarily imply that branded product firms such as Dell and Motorola are the dominant and in many cases the most profitable actors in the chain.

Using the language of Baldwin and Clark (2000), it can be said that Intel, as the dominant platform leader in the PC industry, has the technological capability and market power to unilaterally change the location of key 'pinch points' in the GVC. In other words, Intel can decide how to bundle tacit, proprietary activities and where to locate the points in the chain where codified handoffs can occur and open standards can begin. It is logical to think that PC producers, if they were able to develop a viable substitute for Intel chipsets, would seek to protect and enhance their profitability by abandoning Intel. In fact, many have tried in the past. IBM's late 1980s Microchannel PC architecture and the 1990s IBM/Motorola/Apple PowerPC CPU (central processing unit) alliance are examples of how branded PC companies have tried, and failed, to supplant Intel's platform leadership in the PC industry. In mobile phones platform leadership is also present, but more diffuse. Key underlying patents are held by a broad array of companies, most notably Nokia (Finland), Ericsson (Sweden), Qualcomm (USA), Motorola (USA), and NTT DoCoMo (Japan). Other proprietary system elements are embedded in functional semiconductor 'intellectual property' blocks offered by companies such as ARM (UK) and CEVA (USA). Patent holders for cellular technology are in a position to cross-license with each other, which lowers their royalty expenses relative to non-patent-holding rivals, but non-patent holders who produce phones must pay steep royalties for these layers of technology licensing that can add up to $5 to $8 per phone. In most industries, however, system architecture is more completely defined by lead firms, providing them with the market power to select among alternative vendors and capture the lion's share of value created within the chain. Personal computers and mobile phone handsets are important and well-known cases of industries where platform leaders dominate, but it is important to note that such cases are in fact quite unusual.

Very few platform leaders have as yet emerged from the developing world. In the electronics industry a notable exception is MediaTEK, a 'fabless' semiconductor design company founded in 1997 in Taiwan. The company has moved along with the market, providing chipsets for reading compact disks (CDs), digital video disks (DVDs), digital video recorders (DVRs), and high-definition televisions (HDTV). Most recently

MediaTEK mastered the difficult art of combining fundamentally different technologies, such as analogue and digital signal processing on the same chip, in what is known in the industry as 'system-on-chip' (SOC) technology. Using SOC capabilities, the company began offering single-chip 'platform solutions' with the advantages of lower cost, smaller size, and lower power consumption, while sacrificing, to some degree, the ability to customise platforms in the interest of product variety. In the years 2004 and 2005, MediaTEK leveraged its experience in audio, imaging, and video to develop chipset solutions for mobile phones with functionality for audio capture (voice recording), music playback (MP3), image capture and playback (camera and video phones). MediaTEK chipsets have played a central role in supporting the development of low-cost phones suitable for the Chinese market, covered later in this paper (as well as in the paper by Brandt and Thun in this special issue and by Imai and Shiu, Forthcoming).

5 The rise of supplier capabilities in electronics GVCs

East Asia has contributed to the development of GVCs for a long time and in different ways. Japanese trading companies were some of the earliest sources of low-cost consumer goods for the West, such as footwear and apparel produced for large retailers in the USA and consumer electronics produced for branded lead firms such as RCA and Philips. When wages rose in Japan, Japanese trading companies became intermediaries in more complex 'triangle manufacturing' arrangements that brought factories in Korea, Taiwan, and Hong Kong into a system that had previously consisted of Japanese factories exporting directly to countries in the west (Gereffi, 1999). Eventually, global buyers in the West learned how to buy directly from factories in developing East Asia, or through local intermediaries in places like Hong Kong.

As firms in Korea and Taiwan began to supply more technology-intensive products like electronics with help from the state, their paths diverged. By and large, Korean firms followed in Japan's footsteps. During the 1980s Korean *chaebols* (business family) emerged as large, diversified enterprise groups with a vertically integrated stance toward product development, manufacturing, and marketing. Today, using their own brand names, Samsung, LG, and Hyundai Motors compete head to head with firms based in the USA, Japan, and Europe in global markets for technology-intensive products, such as mobile phone handsets, flat-panel television sets, and passenger vehicles.

In Taiwan, however, local manufacturers began by supplying components and subassemblies, rather than finished products, but sought – and indeed were asked and in some cases forced by de-verticalised 'manufacturers' in the West – to move up the value chain. As a result, they began to assist in the design process and take full responsibility for component purchasing, final assembly, and the organisation of multi-country value chains in East Asia. Taiwanese contract manufacturers had long hoped to leverage this learning process to become full-blown original brand manufacturers (OBMs), selling their own branded products on markets (Weiss and Hobson, 1995). Few have been successful, however, in large part because OBM activity brought them into direct competition with their customers (small in number and very powerful), and put future orders at risk[5]. The fallback strategy for Taiwan-based suppliers was to remain within the expanding set of value chain niches that had been made available, and to increase their range of competencies in contract manufacturing and design services, while expanding geographically into Mainland China in an effort to respond to customer demands for

ongoing cost reductions. As a result, a different business model and path to development, separates Taiwanese firms, such as TSMC, Quanta, and Hon Hai, from their Korean 'national champion' counterparts, such as Samsung and LG.

The reasons for the different paths of Korea and Taiwan are complex. They include the more fragmented industrial structure of Taiwan noted by Feenstra and Hamilton (2006), the larger home market in Korea, different capabilities in the customer base (retailers versus de-verticalising manufacturing companies), and different state policies (the Korean state actively promoted vertical and horizontal integration). Korea's earlier insertion into GVCs also played a role. From more arms-length relationships, GVC coordination and governance evolved. Taiwan's buyers were more circumspect about offloading full design and product conception responsibilities to suppliers, in part because they had observed how Japanese and Korean suppliers had overtaken their customers with their own brands in consumer electronics (televisions) and home appliances (microwave ovens). The differences between Korea and Taiwan, then, reflect differences in strategy, developed in a co-evolutionary manner with a set of de-verticalising customers, and not just different starting points in industrial structure. As a result, we see Taiwan as transitioning toward the new 'compressed development' model rather than simply a variant of 'late development'.

The success of the ODM contract manufacturing model eventually shifted Taiwan's industrial policy away from efforts to create full-blown, vertically integrated, globally competitive national industries through a process of sequential value chain upgrading. Eventually, most ODM contract manufacturers and other Taiwan-based suppliers in electronics GVCs realised that it was better to spin off their branded product divisions to compete in end markets and, as shall be seen, a few of these 'contract manufacturer spinoffs' have met with some success.

The following sections detail the development of suppliers based in three places: Taiwan (China), the USA, and Guadalajara, Mexico. While outsourcing in electronics GVCs has driven supplier development in many places across the world at many stages of the value chain, these case studies provide a range of emblematic cases in the contract manufacturing stage:

1 global suppliers from an advanced economy (USA)

2 regional suppliers from a newly developed economy (Taiwan, China) that have shifted the bulk of their production to Mainland China

3 the operations of global suppliers that have been set up in a developing economy to feed an adjacent, advanced economy market (Guadalajara, Mexico into the USA).

These three patterns of GVC development, taken together, describe a range of experiences that have larger resonance in the world economy. The experience of Guadalajara, for example, is similar to that of other places in the world that have received investments from global contract manufacturing firms for rapid supply into nearby advanced country markets, such as plants that were established in Hungary, Poland, and the Czech Republic to export mainly to Western Europe. But the cases presented here do not describe all experiences. As already mentioned, Korea developed partly as a supplier of components, contract manufacturing and design services, but even more as the home base for large, vertically integrated product companies that now compete head to head with branded electronics companies from Europe, Japan, and the USA. Many, if not most countries in East Asia have received investment from Japanese electronics firms seeking

to avoid tariffs and export to Europe and the USA (see Hobday, 2001; Oikawa, Forthcoming). In many, if not most other places in the developing world, the only link to electronics GVCs is in the form of finished product imports.

5.1 Contract manufacturers from Taiwan (China): a focus on PCs and a shift to the Mainland

Taiwan-based ODM contract manufacturers have come to dominate world production of PCs, but have historically had difficulty selling their own branded products to consumers[6]. However, the recent economic crisis may have created new opportunities for Taiwan-based firms to overcome these barriers, as will be discussed in this section on the evolution of electronics hardware production in Taiwan.

Taiwan has developed what is arguably the world's most capable and agile supply-base for the design, manufacture, and delivery of PCs and related products, especially notebook computers (Dedrick and Kraemer, 1998). This powerful productive engine has developed, almost in its entirety, in response to orders from lead firms based in the USA, and more recently, Japan (Sturgeon, 2007). At the same time, the development of contract manufacturing in Taiwan and elsewhere has provided lead firms with an increasing range of sourcing options. This process of co-evolution means that Taiwan's electronics industry has been able to develop without a significant cadre of local lead firms. From the late 1970s to the present day, sourcing from Taiwan has expanded from computer monitors, to various components and subsystems, to complete desktop and notebook PC systems.

Enormous market expansion and the modular system architecture of PCs, especially the dominant role of Intel's central processing units (CPUs) and Microsoft's Windows operating system software in setting system architecture, along with intense competition and short product life cycles, have created the conditions for the emergence of a set of firms specialising in the iterative, post-architectural portions of product design. However, because most functionality resides in chipsets and software – system elements that computer producers do not design – control over the innovative trajectory of the industry has continued to reside in 'platform leaders' such as Intel and Microsoft, which have traditionally worked closely with branded PC firms on future requirements. However, as the notebook format has come to dominate consumer PC sales, and branded PC firms have either left the business (IBM), changed their business focus to bundling services with PCs (Hewlett-Packard), or tried to move up-market to servers and storage systems (Dell), Intel has begun to work more closely with Taiwanese firms on the requirements for next generation CPU design for mobile computing (Kawakami, forthcoming).

The migration of Taiwan's electronics production to Mainland China began to accelerate in the mid-1990s, following a sharp drop in desktop PC prices (some models fell below $500). The migration started with components and peripherals and then spread to assembly of desktop PCs and motherboards, with the latest stage being notebook computers in the period 2001–2006, when notebook PC ODMs moved nearly all of their manufacturing from Taiwan to Mainland China. As sales of notebook PCs expanded rapidly, surpassing desktop units in the early 2000s, production in Taiwan soared from 2.3 million units in 1995 to a peak of 14.3 million in 2002. However, after 2002, notebook PC production in Taiwan dropped just as rapidly, even as Taiwanese firms produced a larger share of the world's output,

reaching 92% in 2008. This migration contributed to the dramatic expansion of two industry clusters for electronics manufacturing, one in the Pearl River Delta near Hong Kong focused on the assembly of desktop PCs, PC main boards, and peripheral products, and the second in the Yangze River Delta near Shanghai, focused on notebook PC assembly. Smaller Taiwanese contract manufacturers and component suppliers were not able to make this move, leading to a dramatic consolidation among firms specialising in notebook PC production: the number of Taiwanese notebook PC producers fell from 45 in 1993 to only 21 in 2006, with market share shifting dramatically in favour of the largest five producers (Kawakami, Forthcoming).

The co-evolution of lead firms, suppliers, and platform leaders outlined here reveals a recursive dynamic of outsourcing, upgrading, and further outsourcing; the enabling role of open standards and modular product architecture in the PC sector; the intense competition and rapid product life cycles that drove lead firms to seek to spread risk and lower costs through outsourcing; and the entrepreneurial agility displayed by Taiwanese firms to recognise and quickly seize new opportunities to specialise in narrow segments of the value chain[7].

5.2 Contract manufacturers from the USA: a diversified product portfolio and a global footprint

In the USA electronics industry, a combination of globalisation, outsourcing, and vertical bundling at suppliers in the 1990s helped to push a small but elite set of supplier firms to quickly move beyond their traditional cluster- or national-scale footprint to become global in scope. Vertically integrated lead firms with global operations based in both the USA and Europe, including Lucent, Nortel, Alcatel, Ericsson, and Apple Computer, sold off most, if not all, of their in-house manufacturing capacity – both at home and abroad – to a cadre of large and highly capable US-based contract manufacturers (Table 3), including Flextronics/Solectron, Jabil Circuit, Celestica, and Sanmina-SCI (Sturgeon, 2002; Sturgeon and Lee, 2005).

In the round of consolidation that followed the technology bubble bursting in 2001, Flextronics (listed in Singapore, but managed from San Jose, CA) emerged as the world's largest electronics EMS contract manufacturer, a position that was further solidified through its acquisition of number 2-ranked Solectron in 2007. Flextronics' 2009 revenues were slightly less than $31 billion. Aside from dozens of stand-alone factories and technology centres around the world, Flextronics, with its strategy of 'vertical integration', operates nine huge 'industrial parks', where it has 'invited' many of its most immediate suppliers of product-specific components (bare printed circuit board and plastic enclosures) to co-locate with its final assembly plants for rapid response in regional markets. Flextronics has one industrial park in Poland and two each in Brazil, China, Hungary, India, and Mexico. In a pattern typical of many goods-producing industries, facilities located in developing countries tend to be significantly more vertically integrated than those in industrialised countries, where existing local suppliers and component distributors can be relied on for inputs.

The sale and spinoff of in-house manufacturing and parts operations in the American and European electronics industries underlines the structural shift that has been occurring in the electronics industry from in-house production to global

outsourcing. The accumulation of this offloaded capacity within a relatively small number of huge suppliers shows the dramatic consolidation and increasing integration of the global supply-base. However, outsourcing, as such, does not tell the entire story. In the electronics industry, fast-growing lead firms with little if any in-house production capacity, such as EMC, Sun Microsystems, Cisco, and Silicon Graphics, also demanded that suppliers provide global support. And, in some key locations, lead firms did not necessarily have plants to sell or spin off, especially in newer locations like China and Eastern Europe. As a result, a great deal of the global expansion of suppliers in the 1990s was either 'organic' in character, involving the enlargement of existing facilities and the establishment of new 'Greenfield' plants[8], or achieved through the acquisition of regional suppliers, in what some industry participants refer to as the 'rolling up' of regional supply bases to create a global footprint.

Global coverage allows the largest EMS contract manufacturers to produce high-volume, price-sensitive products for global markets from plants in China, and higher value, medium-volume products in regional production facilities such as Mexico and Eastern Europe. It also enables them to produce a variety of products locally for regions containing large developing countries such as India, Brazil, and China, and to work closely on lowest volume, highest value products with customers in industrialised counties, in places like Silicon Valley.

However, expansion in the 1990s was so rapid that the largest EMS companies quickly became overextended. Integrating diverse plants acquired from customers and competitors left these firms with excess capacity, facilities with incompatible factory and information systems, and too many plants in high-wage locations. Efforts at consolidation are ongoing, but overexpansion and poor management left certain companies, especially Solectron and SCI, with too much inventory in the system and in very weak financial positions, making them ripe for acquisition. After the 2001 technology bubble burst, contractors made a strong push to increase capacity in low-cost geographic areas, especially China, and, as shown in the next section, to transform regional production hubs in Mexico and Eastern Europe to produce higher value, lower volume products previously manufactured in the USA and Western Europe.

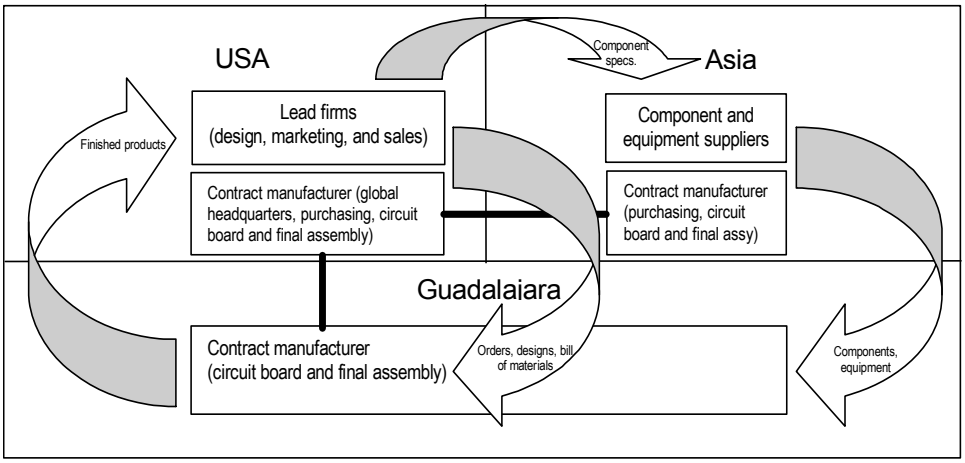
5.3 Contract manufacturing in Guadalajara, Mexico: a production base for global suppliers and a shift to higher value products

Economic downturns can have obvious negative effects on workers, companies, industrial clusters, industries, and entire national and regional economies[9]. But they can also provide an impetus for positive change, adaptation, better prospects for sustainable development for the long term, and an improved ability to weather future downturns. One example is the electronics cluster in Guadalajara, the capital of Jalisco State in southwest Mexico. The technology bubble bursting in 2001 was felt acutely across electronics GVCs, and the Guadalajara electronics cluster was no exception. Companies and facilities there went through a wrenching and rapid decline, but recovered through a remarkable process of industrial upgrading. This involved a move to new products and processes, as well as changes in work organisation and training as high-volume

production lines were transformed into high-mix production cells to accommodate a greater variety of higher value products.

The Guadalajara electronics cluster is deeply embedded within electronics GVCs. With few exceptions, electronic goods produced in Guadalajara are designed and sold by US-based lead firms. Most are produced by affiliates of US-based global EMS contract manufacturers using imported components and equipment, especially from East Asia (see Figure 1). Almost all output is exported, the vast majority going to the USA.

Figure 1 Position of the Guadalajara electronics cluster in electronics GVCs



Note: Guadalajara, Mexico

Source: Authors' drawing

Until 2001 Guadalajara's factories competed directly with those in China in the production of high-volume, price-sensitive items such as mobile phone handsets and notebook computers. Because global suppliers dominate the landscape of electronics GVCs, competition between locations often occurs within the global footprint of contract manufacturers. Thus, decisions to shift work from one location to another are taken by the managers of contract manufacturing firms, carried out at the request of lead firm customers, or some combination. During 1994–2000, the value of electronics exports from Jalisco State, which contains the Guadalajara metropolitan area, on average, increased at a rate of 35.4% per year. During 2000–2005, the average annual export growth rate declined to only 1.3% per year, falling in absolute terms for several years (see Figure 2). While a few foreign electronics firms (for example, Hewlett-Packard and IBM) had been operating in Guadalajara since the 1970s, a new wave of foreign direct investment (FDI) peaked at US$611 million in 1998 as the affiliates of global EMS contract manufacturers expanded in the area as part of the worldwide expansion strategy described earlier. Flextronics, Jabil Circuit, Solectron, Sanmina-SCI, Benchmark, and Foxxcon (Hon Hai) all established facilities in Guadalajara, along with a handful of multinational component manufacturers and a few component distribution companies to manage the increased inbound flow of components. Because the decline in output after 2001 followed these huge investments, capacity utilisation dropped precipitously and remained low for several years. As Figure 2 shows, the nadir for both employment and exports was 2003.

Figure 2 Guadalajara 'high-tech' employment and exports, 1996–2009

Source: CADELEC (2010)

With new, large, state-of-the-art production facilities sitting idle, the stakes were very high in 2001 to 2003. Employment had grown to about 10,000 workers each at several of the largest plants, and total high-tech employment in Jalisco State peaked at 76,666 in 2000. After the technology bubble burst in 2001, employment dropped by 40% to 60% at some plants, with total high-tech employment in Jalisco falling by 40% to 45,877. This downturn was more than a temporary drop in demand. In an effort to lower costs, global contract manufacturers were shifting high-volume work to their plants in China. There was no expectation that this work would come back to Mexico when the crisis abated. Failure to find new business would likely have meant further stagnation, decline, and possible plant closures. In an effort to utilise their state of the art investments in Guadalajara, the global firms provided the electronics cluster there a new role in the global industry: produce higher priced, lower volume products, often on a direct-ship, rapid replenishment basis to retail outlets in the USA. Examples of such medium volume, medium price point electronics products include low and mid-range computer servers, electronic fish finders for use in recreational boating, alarm systems for homes and businesses, and the like.

This strategy led to a dramatic transformation and gradual recovery to pre-crisis levels of employment and exports. Very few of the products made in Guadalajara in 2000 are still made there. The assembly of high volume, price sensitive products has been shifted to other locations, mainly China, for export back to the USA and other advanced country markets. Final assembly workers, therefore, have had to adapt to a much more complex and challenging production environment. Instead of performing one or a few operations on the same product for months at a time, line workers must frequently

perform new and different operations as a variety of products move down the line. Such work is much less geographically mobile.

Materials management, for both circuit board and final assembly, also became much more complex, and many plants are working to adopt the most advanced 'lean production' methods for maintaining quality in the face of product variety. While circuit board assembly machines still feed final assembly stations in linear fashion, final assembly has been reorganised into 'cells' that hold very little inventory and where workers perform several tasks rather than a single task. Finally, new logistics functions have been added to ship small lots, often by air, directly to retailers for distribution. Materials management, testing, and quality assurance systems have all been upgraded dramatically to accommodate the vast increases in product variety[10].

The changes in Guadalajara's electronics industry since 2001 are a striking example of 'industrial upgrading' (Humphrey and Schmitz, 2002), in which the industry shifts to higher value products, more advanced processes, and adds a host of new functions and services. However, it is important to note that many of the techniques that support these changes were developed outside of Guadalajara. In this way, global contract manufacturers can provide a powerful mechanism with which to disseminate best practices. On the other hand, our field research also found that local officials, plant managers, and workers played a powerful role in the transformation of the region. Finally, while employment at foreign-owned contract manufacturing facilities is now back to 2001 levels, local suppliers have not made the transition to the new high-mix product profile of production in Guadalajara, and employment has not recovered at most of these firms.

The case of the transformation of the Guadalajara electronics cluster provides some lessons for the concept of GVC upgrading and for the prospects for economic transformation in locations where modular GVCs touch down. First, any neat partition between product, process, and functional upgrading as specified by Humphrey and Schmitz (2002) seems problematic because of the powerful complementarities that flow from product upgrading. The shift to higher value, lower volume products, in this case, *required* firms to upgrade processes to accommodate rapid changeover and to add new functions to control a much more complex inventory basket and to develop new engineering inputs to support changes. Second, rapid upgrading was possible in part because the skills to do so had been developed within the larger global structure that the facilities in Guadalajara are part of. Finally, the authors' research found that local firms have not been able to adapt to the new requirements of the cluster, in part because the resources and knowledge to transform their plants is not available locally. These local firms have generally not been able to upgrade their operations in concert with the branch plants of global suppliers. Since many could not make the transition to high mix production, they have had their already tenuous linkages to electronics GVCs severed entirely (Gallagher and Zarsky, 2007). Nevertheless, the upgrading achieved after the technology bubble burst in 2001 may have provided the Guadalajara plants owned by global suppliers with some protection during the current economic crisis.

6 Upgrading: pluses and minuses for developing country firms

The advantages of incumbent lead firms with deep technological expertise, in terms of value extraction in GVCs, as well as the limitations for firms based in developing

countries, are illustrated by the well-known case of Apple Computer Inc. Linden et al. (2007) estimate that only $4 of the $299 retail price of an Apple 30 gigabyte video iPod MP3 player is captured in China, where they are assembled and tested by the Taiwan-based ODM contract manufacturer Inventec. The share captured by domestic Chinese companies is even less; probably limited to packaging and local services. This is, in part, because iPods are assembled from components made mostly in other countries, such as the USA, Japan, and Korea. But more importantly, it is because Apple – which conducts high-level design work and software development in-house and orchestrates the product's development, production, marketing and distribution – is estimated to capture $80 of the sale price. This study also estimates that $83 is captured in the USA by Apple's technology suppliers and by retailers. Clearly, assigning the $183 per unit wholesale price of exported iPods (as would be reported in trade statistics) to the Chinese economy misrepresents where value is created in the global economy. Similarly, a 'teardown analysis' of the recently released iPad tablet computer by the consulting firm iSuppli estimated Apple's gross margin for the product (the $499 sale price less the component costs) to be $270, or 54% (Hesseldahl, 2010). Assembly costs for the iPad may be higher than for the iPod, but it can still be assumed that very little of the product's value is captured in China, and even less by mainland Chinese companies.

For developing country lead firms involved in product innovation, such as the Chinese mobile phone handset producers and independent design houses discussed by Brandt and Thun in this special issue and by Imai and Shiu (forthcoming), the solution in technologically intensive product areas like electronics is to purchase highly modular design solutions from platform leaders. This allows quick market entry, but can also lead to several traps. First, as already mentioned and to be covered in more depth later, there are the high costs associated with acquiring highly functional components and subsystems, as well as the royalties that must be paid, directly or indirectly, to the platform leaders and other standard setters in the industry. Second, there is the 'modularity trap', as identified by Chesbrough and Kusunoki (2001), where the highly integrated off-the-shelf components and subsystems provided by platform leaders reduce product distinctiveness. By and large, the world's major contract manufacturers have been trapped in low value-added segments of the electronics GVC: manufacturing and iterative, detailed design. In the PC industry, most of the industry's profits have been captured by branded lead firms such as Dell and Hewlett-Packard, and especially by platform leaders in software operating systems (Microsoft) and CPU chipsets (Intel). But as developing country markets grow, the space for these less than cutting edge product categories is expanding rapidly, providing openings for developing country lead firms relying on highly modular design solutions.

7 Overcoming the limits to industrial upgrading in electronics GVCs

Examples such as the Chinese mobile phone handset industry reveal the opportunities, but also the challenges and limits to industrial upgrading in electronics GVCs. On the other hand, there are a growing number of important exceptions that suggest that new models of learning through close engagement in GVCs could be emerging, with broader lessons for developing countries (see Yeung, 2009). As mentioned in the beginning of the paper, there are four identifiable models electronics companies from the developing world are using to escape these limitations:

1 global expansion though acquisition of declining brands (emerging multinationals)

2 separation of branded product divisions from contract manufacturing (ODM spin-offs)

3 successful mixing of contract manufacturing and branded products (platform brands) for contractors with customers not in the electronic hardware business

4 the founding of factory-less product firms that rely on GVCs for a range of inputs, including production (emerging factory-less start-ups).

The analysis in this final section is derived from the authors' ongoing research and secondary sources covering very recent events and nascent trends. As such, it is more speculative and forward-looking and less certain.

7.1 Emerging multinationals: exceptions or the new rule?

The case of Lenovo, a partially state-owned Chinese PC company, shows one way in which lead firms from developing countries have been able to overcome traditional barriers to upgrading their positions in GVCs[11]. In the mid-1990s Lenovo, benefiting from a protected market, emerged as the largest domestic producer of PCs in China. As import restrictions were lifted, however, Lenovo struggled to remain competitive, as have most developing country national champions in technology-intensive sectors. After the technology bubble burst in 2001, persistent low profitability in the global PC industry, for the reasons described earlier, led some of the largest multinational producers to exit the industry, precipitating a wave of acquisitions, most notably Lenovo's purchase of IBM's huge PC division in 2004.

The IBM purchase gave Lenovo a new headquarters in the USA with a large R&D centre in North Carolina; an advanced notebook computer development facility in Japan; three final assembly plants in China and one in India; regional distribution facilities in the Netherlands, Dubai, Florida, Australia, and India; and an important corporate planning, finance and business process development group in Singapore. The deal also came with a dense set of ongoing supply relationships, mainly with Korean, Taiwanese, and American component producers and contract manufacturers, the largest with global operations, to provide main boards, microprocessors, memory, disk drives, monitors, LCD screens, keyboards, and contract manufacturing services[12]. Lenovo's new American CEO, based in Singapore, was a former Dell Computer executive. He led a management team with top executives from China, the USA, Europe, and India. While it would be wrong to portray Lenovo as something other than a China-based company, the structure, geography, ownership, leadership, supply base, and sources of innovation at the new Lenovo were vastly different from the national champions that emerged in Japan and later in Korea[13].

Lenovo can be seen as an example of a small but dynamic set of 'emerging multinationals' (Bonaglia et al., 2007), also called 'dragon multinationals' by Mathews (2002) in the context of Chinese East Asia. In many cases, such firms can fairly be characterised as updated, globalised manifestations of traditional national champions. Additional examples include other Chinese firms such as Huawei (communications infrastructure equipment) and Haier (home appliances and consumer electronics), as well as firms from countries as diverse as Mexico (Mabe, home appliances; Cemex, cement) and Turkey (Arçelik, home appliances). As Bonaglia et al. (2007) put it,

> "These new [multinational enterprises] did not delay their internationalization until they were large, as did most of their predecessors, and often become global as a result of direct firm-to-firm contracting. Many *grow large as they internationalize*; conversely, *they internationalize in order to grow large*." (p.3, emphasis in the original)

These companies have sometimes become global by 'rolling up' (purchasing) smaller regional producers with well-known but declining brands using funds generated not so much by selling products or services in their home markets but by acting as suppliers to existing multinationals, tapping into international capital markets, and producing and selling globally.

What remains to be seen is whether these examples are exceptions that prove the rule or the vanguard of a new wave of multinationals with roots in the developing world. Whatever their prospects, they will still have to contend with very large and powerful incumbent players. It is notable that all of the emerging multinational mentioned here, with the exception of Huawei and perhaps Lenovo, work in extremely mature product areas. It is not surprising, then, that these firms have had the most success in burgeoning emerging economy markets, were low costs are more important, for the moment, than high functionality or product quality. It also remains to be seen whether companies from the developing world can prosper in the lead firm position without building up deep internal expertise in market and product definition organically or whether such expertise will continue to develop once it has been captured through acquisition. In some cases, however, such as Lenovo, the learning curve seems to be extremely steep, in part because research and design centers and other expertise acquired in advanced economies has so far functioned effectively within the firm. In other cases, such as Huawei, burgeoning sales, driven by market growth in the developing world, provides them with a high level of buyer power that has won them the ardent attention of advanced component producers around the world.

7.2 Contract manufacturer spinoffs: settling for scraps or setting the agenda?

The recent economic crisis came with a set of significant successes for a set of Taiwan-based ODM spinoffs, branded factory-less lead firms that have become legally independent from their former ODM contract manufacturing arms. Acer pioneered this model when it separated its branded PC business from its ODM contract manufacturing (Wistron) and PC peripherals (BenQ) businesses in the early 2000s. By doing so, the company successfully avoided competing with their ODM customers in final markets and put Wistron into position to compete with pure-play (that is, contract manufacturing only) ODMs such as Quanta and Compal, which had been winning huge contracts at the expense of Acer. In order to create viable conditions for the contract manufacturing business, spun off lead firms typically make aggressive moves to use non-affiliated ODMs for contract manufacturing services. For example, today Acer uses Quanta and Compal for the bulk of its contract manufacturing services; Wistron now ranks a distant number three. ASUSTek, founded by former employees of Acer in 1990, followed suit when it spun off Pegatron in 2008.

One case is the successful launch of 'netbook' computers, the ultra-low-cost portable PCs, by Taiwanese branded firms. Again, the market focus niche is for price sensitive consumers in advanced (during the crisis) and developing country markets (for the foreseeable future). AsusTek first developed the idea for simple-to-use and ultra-low-cost

portable PCs in 2006 and launched its first product, the 'EeePC' netbook computer, in 2007 (Shih et al., 2008). The quick success of the EeePC set new expectations for PC consumers regarding PC prices and disrupted Intel's product roadmap, as well as those of competitors in the notebook PC market. Intel had promoted the development of low-price PCs for educational purposes in developing countries, but it had not envisioned or encouraged the netbook product space in *developed* countries. Intel responded by quickly adapting a newer processor, the Atom, developed primarily for embedded products and mobile devices, for use in netbook computers and other low-cost mobile electronics. Traditional branded PC lead firms like Dell and HP were not developing ultra-low-cost machines, not least because price erosion was a perennial concern. In response to the success of EeePC, these firms decided to enter the netbook market as well. Among them, Acer is by far the most successful follower; and a sharp increase in netbook shipments helped them surpass Dell to become the world's second largest selling PC brand by the third quarter of 2009.

During the economic crisis of 2008–2009, the arrival of new platform solutions for low-cost mobile devices – Intel's Atom chipset and Google's Android operating system discussed below – have created new opportunities for contract manufacturer spinoffs to identify and fill underserved market niches, especially for low- to mid-range products that established multinationals previously deemed unattractive. In a dynamic similar to that in the China mobile phone handset case – where local firms used MediaTek platforms to fill underserved low-cost and rural mobile phone handset market niches in China (see the paper by Brandt and Thun in this special issue and by Imai and Shiu, Forthcoming) – Taiwan-based contract manufacturer spinoffs are having success in low-end markets in both developed and developing countries. But instead of being easily pushed aside when consumers demand more sophisticated products, they appear to have the technological capabilities, and the close working relationships with ODMs, to move up-market into more lucrative segments for existing 'mainstream' products.

The case of low-cost PCs recently developed by local companies from Mainland China provides a useful contrast. Inspired by the success of MediaTek, an IC design house based in Taiwan called Via Technologies entered the netbook market with their own platform and by marketing their own low-cost PC chip-set platform to a set of small 'guerrilla' PC makers in China. As with the China mobile phone handset case discussed in the paper by Brandt and Thun, the problem for these firms is an inability to respond when consumers begin to ask for more sophisticated products. The guerrilla PC makers cannot add new features fast enough; preliminary analysis suggests that consumers in China are moving to products from HP, Acer, and Lenovo when they upgrade. Again, developing country markets have been strategically critical for firms seeking to overcome the limits to industrial upgrading in electronics GVCs.

7.3 Platform brands: leveraging modularity to define new (low-end) product categories?

As discussed earlier, competing with customers has proven to be a poor strategy for ODM contract manufacturers. Most ODMs have either given up their brand aspirations or legally separated their branded product business from their contract manufacturing business. A few, however, have been successful in selling branded products, based on highly integrated platforms, in markets that are of little interest to their main contract manufacturing customers. One such company is ASUSTEK, which a long successful

business selling branded PC motherboards to 'value-added resellers' that assemble custom desktop PCs for individual end users and small companies, an especially popular sales channel in Europe. Overall, this sales channel has remained small and is of little interest to dominant PC brands.

A more current example is HTC, a Taiwan-based mobile phone handset ODM founded in 1997. At first, HTC developed handsets branded with the logos of carriers such as Orange, 02, T-Mobile, Vodafone, Cingular, Verizon, Sprint and NTT DoCoMo (company website). More recently, HTC won the ODM contract for the G1 Smartphone, based on Google's Android software operating system. Shortly after the G1 hit the market, HTC began selling its own Android-based phone using the HTC brand. In this case, mixing ODM contract manufacturing with the selling of branded products has not created a conflict because Google is not interested in generating profits from selling phones under its own brand. In fact, the opposite is true. The G1 was launched with the intention of gaining platform leadership in smartphones and other Internet-enabled portable electronic devices. Even Android licensing is of little interest to Google as a revenue-generating business. Their main goal is to provide more mobile users with easy access to the Internet, where Google's search engine and other online Google services expose them to Web advertising, Google's main source of revenue. In the context of Google's business model, HTC branded phones are welcome. If Android takes hold in mobile electronics, opportunities for HTC and other firms with the design capabilities to become 'Platform Brands' could expand rapidly.

7.4 Emerging factory-less start-ups: moving into the driver's seat?

Recently, a few firms from developing countries have been able to engage in pure systems integration, assembling system elements purchased through the global supply base. In this sense, they resemble factory-less start-up firms typically seen in advanced technology regions such as Silicon Valley, California. Such firms may or may not have a strong technology kernel, but they inevitably have a clear product roadmap and marketing strategy, and rely on a host of technology and (if needed) manufacturing partners to realise their finished products or services. An example from the automobile sector is Chery, a small state-controlled Chinese automobile company that has been able to develop and market a line of Chery-badged vehicles within a remarkably short time by making use of the supply base, both within China and in the West, These sourcing arrangements show that Chery is nothing like a typical car company, and that it is far removed from the most recent entrants to the mass market for cars, the vertically integrated and horizontally diversified national champions from Korea: Hyundai, Kia, and Daewoo (see the paper by Sturgeon and Van Biesebroeck for details in this special issue).

Similar cases from the electronics industry can be found in the area of portable global positioning and portable navigation devices (PNDs). Until the early 2000s, the mobile navigation market was dominated by Japanese manufacturers such as Pioneer, Panasonic, and Clarion. These firms supplied automakers with very sophisticated systems with rich functions. Because US Government policy limited the accuracy of global positioning system (GPS) signals prior to 2000, the systems developed by Japanese electronics firms relied on comparisons of measured distance and direction travelled to on-board map databases. While some of these systems were sold as aftermarket products, many were supplied directly to automakers for inclusion as optional in-dash original equipment on

new cars. These firms worked closely with auto makers to customise products and meet strict quality standards. Their products had integral system architectures based on proprietary technologies developed in-house and were extremely expensive, as much as one-tenth of a car's sale price.

In the early 2000s, the availability of more accurate GPS signals allowed a set of start-up PND makers to enter the market with ultra-low-cost aftermarket products that quickly began to erode the profits and market share of traditional car navigation makers. Among the market share leaders today are Netherlands-based TomTom, US- and Taiwan-based Garmin, and Mitac, based in Taiwan. These emerging factory-less start-ups are able to produce affordable products by making heavy use of Taiwanese ODMs' capabilities in designing and manufacturing portable electronics. In contrast to the integral architecture of in-dash car navigation systems, PNDs have highly modular architecture, which lowers development costs. PNDs initially cost only $500 to $1,000, but today TomTom's lowest cost model sells for less than $100. This affordability opened up new markets, such as handheld GPS, and world shipment of PNDs grew from less than one million units in 2004 to more than ten million units in 2006 (Nikkei Electronics, 2007). While not all of these companies are fully based in Taiwan, they are all making heavy use of Taiwan-centred supply-base capabilities. Tom Tom outsources to Inventec and Quanta. Garmin was founded in the USA by a Taiwanese immigrant entrepreneur; R&D and production are both located in Taiwan. Mitac itself is a Taiwanese IT hardware company.

Again, companies that jump to the head of GVCs in this way are quite common in the industrialised world. Many are started in Silicon Valley each year, for example. But without the backdrop of a technology cluster with the capital and intellectual resources of Silicon Valley, emerging factory-less start-ups may be unable to develop the deep design, system integration, and market-defining expertise that would allow them to compete at the vanguard of fast-moving markets. On the other hand, with close relationships with the world's most dynamic set of EMS and ODM contract manufacturers, it seems inevitable that an increasing number these firms will meet with success over the long term.

7.5 Crisis and convergence

The recent economic downturn has created a seemingly conducive climate for the implementation of these new models, as shown by the following scenarios. First, traditional Intel customers, the branded PC lead firms, were displeased with the sudden arrival of small, portable netbook computers selling for less than $300, but Intel's quest for business during the crisis may have allowed it to overlook the objections of its traditional customer base. Even without Intel's cooperation, the appearance of excess Celeron stock in distribution channels provided the first opportunity for ASUSTek's EeePC. Second, the economic downturn introduced a new cost-consciousness among consumers in developed countries that made netbooks and PNDs attractive options. The downturn also heightened the search for new markets, and those with the greatest potential for growth are in developing countries, where netbook computers and PNDs may serve as ideal entry-level machines.

In the past, PC standard platforms were largely used in PC-related products, and ODMs were mostly confined to that market. Very recently, the arrival of highly functional but low-cost platforms like the Intel Atom chipset and Google's Android operating system is driving product convergence in netbooks, smartphones, and PNDs.

Intel's Atom chipset, for example, is being used in netbooks, PNDs, embedded systems, and the new Google TV platform. This may be disrupting the status quo and improving the competitive position of ODMs. The introduction of new software-based platforms from companies with no direct prior involvement in the PC industry, such as Google, may be opening up new strategic space for ODMs. By combining new platforms with the capabilities of ODMs, lead firms appear to be able to quickly launch products that cross traditional product boundaries. In this way, convergence is creating a broader market for both ODM contract manufacturing services and new opportunities for platform brands and contract manufacturer spinoffs. These trends may finally steer the Taiwan's electronics industry out of the (albeit very large and expanding) cul-de-sac of PC design and manufacturing and into the larger innovation system of the electronics industry.

8 Conclusions

This paper has summarised the evolution of GVCs in the electronics industry and highlighted some recent developments that have come into focus during the 2008–2009 economic crisis. It shows the increasingly important role the electronics industry has played in GVC formation since 1988 and the growing pull of developing country markets on the industry. Three key actors were identified in electronics hardware GVCs: lead firms, contract manufacturers, and platform leaders. Modularity, in the realm of both product architecture and industrial organisation, has opened strategic space for all three of these GVCs actors. In particular, modularity has allowed the industry's most successful platform leaders to continually stake out and hold key territory in the industry's technological landscape. The strategic moves of platform leaders such as Intel, therefore, can trigger changes across large swaths of the industry.

A key to GVC development, as argued here, is the emergence of deep supplier capabilities, most recently in contract manufacturers based in Taiwan and the USA. Consolidation, both organisational and geographical, has cemented the position of these firms as critical actors in electronics GVCs. Since the largest contract manufacturers have established facilities throughout the world and are purchasing huge volumes of electronic components on behalf of their customers, their investment and purchasing decisions influence industry trends in less developed countries like Malaysia, the Philippines, Thailand, Vietnam, and Mexico. Clearly, the crisis is causing GVCs in the electronics industry to undergo further consolidation. It may be that the firms in the Taiwan/China nexus are joining firms based in places like the USA, Japan, and Europe as key players in the global innovation system of electronics industry – not just the production system, especially as they exploit their advantages in catering to bourgeoning markets in the developing world.

The experiences of electronics contract manufacturers provide examples of both the limits and opportunities for suppliers in electronics GVCs, and thus serve as important lessons for latecomer firms from developing countries. However, given the integrated nature of the global electronics industry, latecomer firms have to consider global suppliers not only as examples but as potential dominant competitors as well. While the barriers created by recent developers are substantial, there are few zero-sum games in an industry as dynamic as electronic hardware. As this paper argues, new models for GVC participants may be emerging that will allow latecomer firms to leverage, rather than seek

to supplant, the deep capabilities that have built up in the global electronics supply base over the past 20 years.

If we are to draw any lessons from the long history of GVC development discussed, it is a lesson against stasis and for continuous change and opportunity. Assumptions about industry life cycles, where product segments stabilise as the industry matures, do not seem to apply to the electronics industry. At the same time, long exposure to the industry's rapid but volatile growth and the sudden emergence of immense new market opportunities (for example, the PC, the mobile phone, and the Internet), has allowed electronics companies in the developing world to build up extraordinary capabilities. We need to ask, not how emerging economies can repeat the experiences of successful recent developers like Taiwan and Singapore, but what roles might be available in electronics GVCs in the future. Newcomers should seek to avoid the pitfalls and limits of GVC engagement and supplier-led upgrading outlined here, certainly; however, in an integrated global industry, this has proven to be exceedingly difficult, even for firms with established roles in the industry and deep expertise in their GVC niche.

Looking forward we must instead consider the possibilities of using the same palette of globally distributed capabilities that firms in the industry see, as well as acknowledging the expanding potential for new combinations. The combination of value chain modularity and deep capabilities in multiple locations will continue to create huge opportunities for both suppliers and lead firms in electronics GVCs. Lead firms have options to assemble and reassemble GVC elements in new ways for new markets and products that did not exist even a few years ago. Dynamic change is nothing new in the electronics industry (see Brown and Linden, 2009). However, going forward, new industries and value chain combinations will inevitably include more firms – lead firms, contract manufacturers, component suppliers, and even platform leaders – based in newly developed and developing countries. We can anticipate, if nothing else, a spate of new lead firms born in developing countries without the expectation that they will need to move up the contract manufacturing ladder in their efforts to become branded companies. Today, more GVC elements are available than ever before, either for sale or for hire, and it is only a matter of time before one, and then several new, world-beating electronics companies arise from the developing world to dominate some as-yet-unknown product or market area in the ever-expanding electronics industry. We may look back on the crisis of 2008–2009 as an inflection point where firms from the developing world began to lead, rather than follow, the development of the global electronics industry. Certainly, the rise of huge new markets it the developing world will become a significant part of the terrain upon which these competitive battles are fought.

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Notes

1 This paper is dedicated to the memories of Seishi Kimura and Ken Imai.

2 US Bureau of Labour Statistics Current Employment Statistics programme, available at http://www.bls.gov/data/#employment (accessed on 15 January 2010).

3 While this risk-taking is a source of lead firms' advantage over suppliers, lead firms often seek to pass on as much financial exposure to suppliers as possible. One such mechanism is 'vendor managed inventory', where suppliers own the parts until the moment they pass onto the factory floor.

4 Markets associated with specific industrial settings are sometimes referred to as 'vertical markets', including banking, legal and accounting services, airline security, shipping, and so on.

5 Exceptions include giant bicycles, which began as a supplier of 'private label' bicycles to US retailers like Montgomery Ward and eventually developed its own line of high-quality branded products, and to some extent Acer, which recently surpassed Dell as the number 2 PC brand in the world after Hewlett-Packard, the first brand not based in the USA or Japan to achieve this high market share (Vance, 2009). Full success with this supplier-driven upgrading model, however, has been elusive (Sturgeon and Lester, 2004).

6 This section draws on Sturgeon and Lee (2005) and Kawakami (Forthcoming).

7 Another important factor that has not been discussed here is the role of Japanese technology partners, which provided critical technologies and components, such as disk drives, that came as 'black boxes' or with licensing restrictions that inhibited Taiwanese firms from building up fully independent technological capabilities. Restrictive licensing agreements have continued to be important, for example in Taiwan's flat-panel display industry (see Akinwande et al., 2005).

8 At Celestica, for example, 40% of global capacity expansion was 'organic' in nature.

9 This section draws from Sturgeon and Dussel-Peters (2006)

10 Increases in product variety vary by firm, but in general it has increased by several orders of magnitude, that is, from tens to thousands. As a result, the number of components in use have increased even more dramatically.

11 This section draws from Whittaker et al. (Forthcoming).

12 The IBM PC Division was in many ways the vanguard of 'de-verticalization' at IBM, and the focus on design and marketing and select critical technologies and capabilities (e.g., integrated mouse pointer technology and notebook design in its Japanese 'Thinkpad' design facility) is a prime example of what leading US 'manufacturing' firms had become during the 1990s though the process of co-evolution with their global (mostly Asian) supply-base.

13 In 2007, Lenovo had 27,000 employees worldwide: 18,400 in China; 2,780 in the USA; 2,040 in Europe, the Middle East, and Africa; and 3,800 elsewhere. In terms of ownership, 45% of the company's shares were publicly traded; 6% were held by IBM, 7% by investment banks, 42% by its parent company legend holdings. The Chinese Academy of Sciences maintained 27% ownership of Lenovo through its 65% share of legend holdings (Zhijun, 2006).

Going mobile in China: shifting value chains and upgrading in the mobile telecom sector

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Abstract: This paper examines the question of how a shift in the end point of a global value chain alters the prospects for industrial upgrading in a developing economy through an analysis of the mobile telecom sector in China. Over the last decade, China has become the world's largest market for mobile phones, and domestic Chinese firms have been able to take advantage of both increasing modularity (to outsource components that they lacked the technology to produce) and their superior knowledge of low-end market segments to expand sales vis-à-vis foreign firms. But these advantages are temporary: high levels of modularity lead to intense competition and low-profits among domestic firms and foreign firms rapidly improve their market knowledge. The key to long-term success for domestic firms is investment in design capabilities, and a shift away from purely modular relationships, but the rapid rate of technical change in the industry complicates this process.

Keywords: China; mobile phones; modularity; shanzhai; industrialisation; emerging markets.

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1 Introduction

The world economy is entering a new phase of globalisation. The first phase involved a tectonic shift in the geography of production. In the 1980s and 1990s, advances in technology and transportation allowed firms to break-up their value chains and relocate production to low-cost regions. Global value chains (GVCs) linked production sites in developing economies with final markets in developed economies. The new phase of globalisation involves a similarly dramatic shift, but this time in the pattern of consumption. Rapid economic growth in emerging markets with large populations is shifting the focus of global firms. Increasingly, the largest markets are in developing economies.

How does a shift in the end point of a GVC alter the prospects for industrial upgrading in a developing economy? This paper examines this question through an analysis of mobile handset firms in China. China is both the largest producer and the largest consumer of mobile handsets in the world. China's role as the 'world's factory' is well-known and mobile handsets are no exception. In 2009, approximately 750 million handsets were produced in China, more than half of total global production.[1] What has changed over the last decade is the scale of consumption in China. The exact size of the market is difficult to pin down, due to the large number of grey market vendors, but most analysts estimate annual handset sales in China to be in excess of 200 million units in 2009.[2]

The purpose of this paper is to analyse the extent to which the rise of the Chinese domestic market for handsets has furthered the development efforts of indigenous Chinese firms. Over the last decade, there have been several pronounced shifts in the relative market share of domestic and foreign firms. These changes are explained through an analysis of two primary variables: the evolution of technology in the sector (and in particular, the extent to which this evolution allows for modular transactions in the supply chain) and the evolution of market demand (which is influenced both by consumers and state policy).

As we explain in the next section, when firms from developing countries integrate in value chains that have consumers in high income countries as their end markets, they face both a technology and a marketing gap (Schmitz, 2007). When the end point of these value chains shifts to their home markets, not only do their shortcomings lessen, the foreign firms that they compete with begin to face technology and marketing gaps of their own.

We then analyse two different periods of development in the Chinese handset industry. In each period, domestic firms have been able to take advantage of both increasing modularity (to outsource components that they lacked the technology to produce) and their superior knowledge of low-end market segments to expand sales vis-à-vis foreign firms. But these advantages are fleeting: high levels of modularity lead to intense competition and low-profits among domestic firms, while foreign firms rapidly improve their market knowledge. The core challenge for domestic firms is translating temporary advantages over foreign competitors into investment in capabilities that provide a sustainable source of competitive advantage. State policy, particularly in how it shapes end markets, can play a critical role in supporting these efforts.

2 GVCs – evolving technology and shifting endpoints

The GVC literature provides a framework for making sense of the globalisation of production. A value chain is the sequence of activities that lead to the production of a particular good or service; governance is the means by which the activities within the chain are coordinated. Understanding the form of governance within a chain, and in particular how various forms of governance affect the distribution of power, makes it possible to understand which firms are able to exert leverage within the chain, and consequently how resources are allocated and the potential gains are distributed.

2.1 From vertical to horizontal

There are numerous factors that help to determine the forms of coordination within a value chain, including firm strategy and the surrounding institutional context, but a critical enabling element is the technology that enables firms to break-up products and processes. The design of a product influences the ease with which activities can be outsourced. When a design is integral, the technical information about how the different elements of the system function is not well-defined, and outsourcing is more difficult. This may be because the buyer has more difficulty specifying requirements to a supplier, or it may be that even when requirements are fulfilled exactly, the product does not integrate with the overall system. Firms may even have difficulty determining who is at fault in these situations. Moreover, given the high level of interdependencies and the highly specific solutions that must be formulated, firms may fear being locked into exploitative relationships with each other [Chesbrough and Kusunoki, (2001), p.204]. An integral design demands a great deal of tacit knowledge, and teams of engineers between firms must work closely together in order to fine-tune the design and performance of the system. Often this means that the various activities within the value chain are coordinated more closely, and hierarchical integration is more likely.

When the design is modular, by contrast, the components (or modules) of the system are designed independently, but function as an integrated whole. Every product that consists of multiple modules will have a *product architecture* that specifies what modules are part of the system and what the function of each will be; *interfaces* that describe in detail how the modules will interact, connect, and communicate; and *standards* for testing the extent to which a module conforms to the design rules [Baldwin and Clark, (1997), p.86]. The structural elements within a module are connected powerfully to each other and relatively weakly to elements in other modules of the same system [Baldwin

and Clark, (2000), p.63]. This creates the potential for a 'plug and play' system in which consumers are able to mix and match modules designed and manufactured by different firms (but with standard interfaces).

The electronics industry provides the classic example of how a shift from integral to modular product architecture can make it possible for an industry to shift from a vertical to horizontal structure. In the 1950s, computer systems had a completely integral design, and this slowed the design of new products because teams of engineers within a single company had to work together on each component [Baldwin and Clark, (2000), p.171]. Outsourcing was not possible, because the connections between different parts of the product design were complex and varied in arbitrary and non-obvious ways. The solution was a shift to modular design: engineers looked for (or devised) natural break points in the design and then established design rules that specified how the different modules of the machine would interact with each other (Berger, 2006). The shift to modularity increased the speed of the design process (because teams worked simultaneously), increased the rate of innovation (because teams could try any number of approaches so long as they adhered to the design rules for interacting with other modules), and created the flexibility needed to meet a variety of customer needs.

The impact on the electronics GVC was two-fold. First, modularity created the possibility of outsourcing. When challenged by Apple in the personal computer (PC) segment, for instance, a modular architecture made it possible for IBM to move to an 'open but owned' system that 'opened' the interfaces within its computer system, and thereby allowed third party vendors to develop components and software, while at the same time it continued to 'own' core proprietary technology [Borrus and Zysman, (1997), p.150]. The problem, however, is that this new approach opened IBM up to competition from highly focused firms in each segment of the value chain, and these firms were able to set standards in their own segment. Intel dominated in the production of microprocessors; Microsoft controlled the development of operating systems. Firms such as Compaq were able to focus on product development, leaving core technology development to key suppliers, and beat IBM to market.

Second, modularity changed the geography of the value chain because outsourcing increased the possibilities for offshoring. The former does not inevitably lead to the latter, but in the context of a liberal trade environment and low transport costs, the competition within any segment of a value chain will be global, and lead firms must decide on the basis of cost, quality, and service where to localise each particular activity. In the electronics industry, these calculations pushed manufacturing overwhelmingly to East Asia, and primarily to China. As Sturgeon and Kawakami (2010, p.3) point out, trade in intermediate goods is a useful measure of GVC activity because the fragmentation of production requires that parts and components cross borders before finished goods are shipped to final markets. According to their analysis (2010, p.6), 'greater China' (mainland China, Hong Kong, and Taiwan) accounted for 33.1% of world import of intermediate goods in electronics and 29.4% of exports in 2006. The increase of China's share between 1988 and 2006 was particularly dramatic: 15.2% for imports and 21.6% for exports. To an unprecedented extent, China is at the centre of activities in the electronics GVC.

Participation in a GVC should not be confused with profiting from GVCs, however. The Apple iPod is a telling example. Most of the component production and all of the assembly occur in Asia, but most of the value added is captured by firms in the USA.

According to the calculations of Linden et al. (2007),[3] Apple captured about $80 of the value of a 30-gigabyte iPod's $299 retail value, and distribution and retail captured another $75. The most expensive component was a Toshiba hard drive, and Toshiba was estimated to have contributed $19 to its overall value. Out of a total of 451 parts, many of which are produced in China, more than 400 have a value between $2 and a fraction of a cent, and the average value was $0.05. The combination of modularity, a liberal trade environment, and highly efficient and low-cost communications and transport systems widens the range of places any particular activity in a value chain might be located, but the profits that accrue to firms in different places of the chain vary widely.

2.2 Governance, power and profits

What determines the distribution of profits within a value chain? At the most basic level, power within a value chain stems from market power (measured in part by concentration or market share) and/or the ability of a firm to position itself in nodes of the chain where it can create and/or capture high returns [Gereffi et al., (2001), p.5]. High returns may be the result of what Kaplinsky calls entrepreneurial surplus, the returns to innovation above the cost of innovation, or barriers to entry that might be created by any number of factors (e.g., patents, control over key raw materials or land, branding, government regulation). The dynamic nature of power within a value chain is critical, and Kaplinsky looks to Schumpeter in his explanation of its implications: "the process of competition – the search for 'new combinations' to allow entrepreneurs to escape the tyranny of the normal profit, and the subsequent bidding away of this economic rent by competitors – fuels the innovation process which drives competition forward" (2000, p.123). Power is almost always dynamic in nature, Kaplinsky notes, and the result of competition is always to erode the high returns that are captured by powerful firms within the value chain (2000, p.123).

The concept of governance in the GVC literature recognises that power and control within a value chain are not necessarily correlated with ownership, and that there are multiple forms of governance [Bair, (2005), p.159]. In his work on global commodity chains, Gereffi (1994, 2001) distinguishes between producer- and buyer-driven chains. In the former, the most powerful firms are those that master the technical (both product and process) and organisational capabilities required to deliver the products that markets demand (e.g., automotive). In the latter, the barriers to entry in production are lower, the key players are the retailers that have the scale to exert leverage over suppliers and organisational skill to manage sophisticated supply networks and the branded manufactures that are able to differentiate their products with marketing and brands (e.g., garments). Although this distinction highlights key differences between sectors such as autos and garments, it has difficulty accounting for the wide range of coordination forms that are possible.

Electronics, for instance, does not always fit neatly in either the producer- or the buyer-driven category. As production in the PC segment globalised, for instance, three principal actors emerged. Lead firms carry branded products and systems that sell in final markets (e.g., IBM, HP, Dell, Apple), contract manufacturers (CM) make products for lead firms (e.g., Foxconn, Quanta, Invetec), and platform leaders are able to implant a particular standard within the industry (e.g., Intel, Microsoft, Apple) (Sturgeon and Kawakami, 2010). Sturgeon, in his work on contract manufactures, explains how increasing modularity in the electronics value chain enabled the rise of CM, and these

firms, with their cutting-edge and global-scale production capacity, lowered the barriers to entry at the buyer-end of the chain. All the buyers are using the same set of CM, and the manufacturing capability of these firms can go to which lead firms have the most effective product strategy, design, marketing, and/or sales channels (2002, p.466). A lead firm in the value chain may coordinate activities without necessarily exerting control over them [Dedrick et al., (2009), p.82].

Recognising the variety of governance forms that are possible, and the manner in which technology can affect the ease of coordination, Gereffi, Humphrey, and Sturgeon developed a typology that uses three variables to characterise the form of a transaction within a value chain: the complexity of information and knowledge that must be transferred, the extent to which this information and knowledge can be codified (and therefore transferred efficiently), and the capabilities of actual and potential suppliers in relation to the requirements of the transaction (2005, p.85). In between the endpoints of hierarchy and market governance they identify three additional forms of governance – modular, relational, and captive value chains – which we will return to in more detail below.

Understanding the distribution of gains within a value chain is important not only for firms, of course, it is crucial for the countries within which these firms are located, and a key purpose of the value chain literature is to understand how firm governance affects development outcomes. Hubert Schmitz (2007), building on work by Hobday, characterises the challenges facing developing country firms as a 'technology gap' and a 'marketing gap'. The technology gap is a result of being cut-off from international sources of technology (and in particular the feedback loop between users and producers that spurs innovation), the difficulty of accessing proprietary technology, and weak national and/or local support for innovation. These technologies may include the 'hard' technologies that are embodied in production machinery and product designs or 'soft' managements systems such as quality control or supply chain management. Humphrey and Memedovic (2003) provide an example of these challenges in their work on the automotive value chain. They see possibilities for developing country firms in lower tiers of the value chain and the aftermarket, but the design and technology demands of the upper tiers of the supply chain creates a ceiling for local firms. The high cost of design in the industry provides a strong incentive for lead firms to communise platforms across markets and this limits the participation of local firms in the upper tiers of the value chain.

The marketing gap is a result of the difficulty a firm will have understanding and responding to rapidly changing consumer demand when it is disconnected from the market. It is exacerbated by highly concentrated retail sectors (which shifts leverage within the value chain to the buyer) and the capital intensity of developing a brand. The garment industry is an obvious example. Gereffi describes an iterative process of industrial upgrading – the large buyers work with suppliers in order to assure quality standards, and as suppliers gain capabilities through a process of 'learning-by-doing', the buyers are willing to transfer a broader range of activities to the suppliers (Gereffi, 1999) – but lead firms are careful to prevent suppliers from encroaching on their core competencies of design, branding, and marketing and their superior knowledge of developed world markets gives them a strong advantage.

The technology and marketing gaps that are faced by a developing country firm are a starting point for this paper. Our purpose is to understand how Chinese handset producers

overcome these challenges, and we consider the question from both a supply and a demand perspective.

On the supply side, the focus is on the forms of coordination between handset assemblers and suppliers, and in particular the extent to which modularity alters the prospects for upgrading. Scholars are divided on whether increasing modularity facilitates or hinders upgrading. Some scholars have argued that greater degrees of modularity allow local firms to increase the extent of outsourcing and focus on those activities within the value chain for which they have a competitive advantage. In the Chinese mobile phone sector, for instance, Zhu and Shi (2010) point to the development of industrial clusters in which the manufacturing process is broken down into many small steps. By outsourcing technology-intensive components and activities, assembly firms are able to maximise their flexibility and responsiveness to the market. Xielin Liu (2005) similarly argues that increasing modularity is leading to creating an alternative strategy for technological catch-up in China. Assembly firms are able to outsource technological innovation and focus on market-oriented innovation; suppliers are able to specialise and achieve economies of scale by supplying modules to multiple assemblers. Modularity allows these firms to outsource non-core activities and focus on the core activities, and thereby, create a competitive advantage [Liu, (2005), p.22]. The expectation is that a Chinese firm will be more akin to a Dell (which does little product research and design) than Tom Watson's IBM (which was highly vertically-integrated).

Other scholars, however, take a more cautious attitude on modularity. Although in some respects modularity lowers the barriers to entry, because non-core activities can be outsourced, it increases the pressure to upgrade and differentiate the activities that remain in-house. The standardisation of interfaces between modules, the utilisation of open standards, and the availability of turn-key suppliers lowers the barriers to entry and increases the level of competition [Sturgeon, (2002), p.466]. The intensity of the competition makes it all the more important for a firm to differentiate itself, but the utilisation of standard components increases the difficulty of product-based differentiation. The implications may be long-lasting, particularly given that technology evolves over time, and an industry that is dominated by modular product architectures may shift back to integral. When this occurs, firms that outsourced core manufacturing and design activities will no longer be able to compete, what Chesbrough and Kusonoki (2001) call the 'modularity trap'. In the case of China, Steinfeld (2004, p.1973) argues that modularity has inhibited firm upgrading. Given that modularity in Chinese industry has increased the difficulty of product differentiation, firms must set the standards within a value chain, shift back to integral processes, and/or compete on the basis of a service such as branding and marketing. In his view, Chinese firms have not had great success pursuing any of these alternatives.

The nature of demand also has the potential to alter the severity of the technology and marketing gap that local Chinese firms face. A consideration of consumer markets is often missing from discussions [on this point, see Leslie and Reimer (1999), Pelupessy and Van Kempen (2005) and Coe et al. (2008)]. Usually, the common assumption is that developed economies are the target markets, and during a period when export-led growth was the dominant developmental strategy, this assumption made perfect sense (Appelbaum and Gereffi, 1994).[4] This assumption should not obscure, however, the extent to which it is the target market that shapes the barriers to entry within a value chain and the size of either a marketing or technology gap. The power of a branded manufacturer such as Nike derives from its ability to understand, respond to, and shape

the culture of a consumer market. The technology that allows a lead firm in the auto industry to dominate the value chain is only important if that technology is demanded by a final market (e.g., the world's most advanced technology for heated automobile seats is of a little advantage to a firm if its target market is Saudi Arabia). The same is true of organisational capabilities. Firms that mastered lean production in the auto industry grew into the dominant players because final markets in the late 1960s shifted away from basic needs towards higher quality, greater differentiation, and faster innovation (Piore and Sabel, 1984). It is the characteristics of demand in the final market that select the capabilities that will allow a firm to exert leverage within a value chain, and thus it is the final market that will determine which firms face a technology or marketing gap.[5]

Shifting the end point of a value chain alters the prospects for upgrading for firms in developing countries. A focus on the domestic market lessens the marketing gap for a local manufacturing firm and makes it possible to broaden its scope of activities into marketing, and branding. This may be because it has a better understanding of home markets than foreign markets, or it may be because domestic customers are not as powerful or as concentrated as their counterparts in GVCs (Bazan and Navas-Aleman, 2004). As Schmitz notes, when a firm from a developing country exports to markets that are similar in structure and consumer preferences to home markets, the marketing gap is narrower [Schmitz, (2007), p.421]. The technology gap may also be lessened at home. In China, for instance, consumers will often prefer 'good enough' quality at a reasonable price rather than cutting-edge technology for a premium (Gadiesh et al., 2007) and the cost structure of Chinese firms gives them an advantage in targeting this market (Zeng and Williamson, 2007). In fact, an increasing focus in the business innovation literature is the technology gap that multinational firms face in emerging markets (Brown and Hagel, 2005; Immelt et al., 2009).

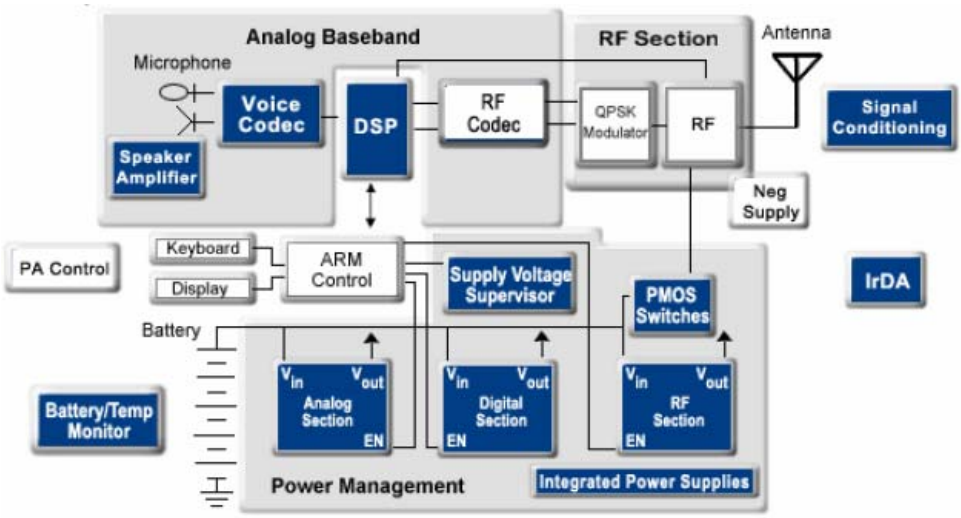
3 The mobile handset value chain

The mobile telecom value chain includes three primary bundles of inter-related activities: mobile handset manufacturing, network equipment manufacturing, and mobile network service provision. In a land-based mobile telecom network, service is divided into small cells with a base station at the core.[6] A call is transmitted to a base station using radio frequencies, and as the user moves between cells, the call is automatically switched from one base station to another and from there to a central switching office. The core equipment in the network is the handset, the transmission equipment (base station, relays, and other components that transmit the signal from base station to handset), and the switching equipment (a combination of hardware and software that coordinate the flow of traffic over a network of base stations). In order to communicate with each other, these three components must utilise a common technological standard at their interfaces. A mobile network operator (MNO) licenses radio spectrum from a government, purchases network equipment from vendors, and provides mobile services to consumers using handsets. In an operator-driven system, the operator provides handsets as part of a calling plan; in an open system, the consumers are able to purchase handsets independently of the calling plan.

The transformation of the mobile handset industry over the last two decades mirrors broader trends in electronics in that digitalisation has transformed the industry. The first

generation (1G) technology, which was developed in the early 1980s, relied on analogue equipment. The core challenge for handset manufacturers was reducing the size of components in the phone and designing the circuitry so as to lower battery consumption [Galvin and Rice, (2008), p.7]. The product architecture was largely integral, and vertical integration was common [Park et al., (2009), p.792]. Starting with the second generation (2G) of handsets, the sector shifted to digital technology. When a person speaks into one of these handsets, an analogue voice wave hits a sensor on the microphone which is then converted into a digital signal (represented by 1s and 0s) by the voice codec (coding/decoding), then sent to the digital baseband processor (DSP) before being converted back into analogue by the RF Codec and the radio frequency (RF) that is used for transmission (see Figure 1). The use of digital standards makes it possible to increase the rate of transmission, because the frequency band can be divided, and it also makes it possible to improve sound quality through filtering. Multiple standards emerged: CDMA (developed by Qualcomm) became dominant in the USA and GSM (developed by Nokia and Eriksson) became dominant in Europe. Third generation (3G) technology, which was developed at the end of the 1990s, made it possible to transmit 5–50 times the amount of data of 2G technologies [Ghemawat, (2004), p.3], an improvement that was crucially important as mobile internet applications became common, and again there were multiple competing standards, including one developed in China.

Figure 1 Component diagram for a digital 2G handset (see online version for colours)

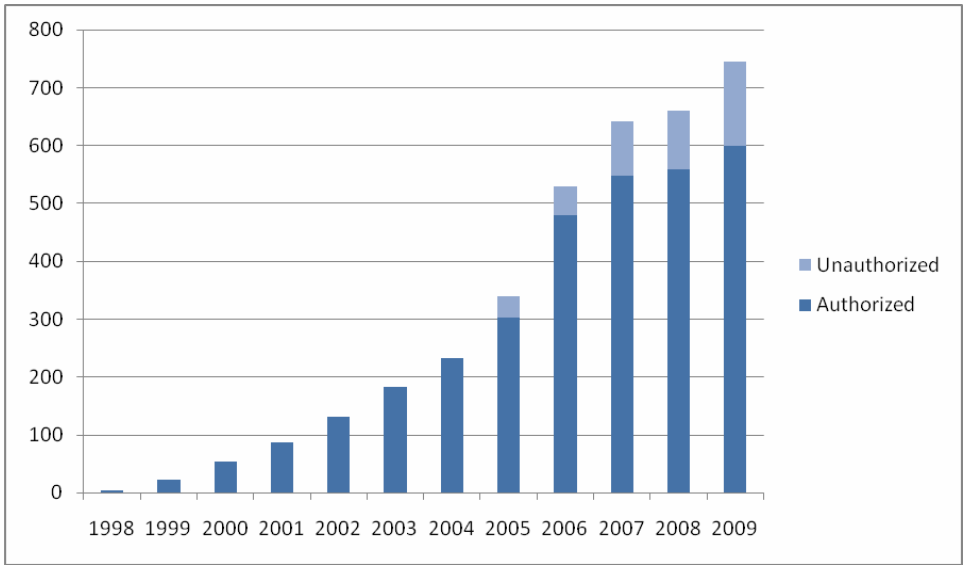


Source: *Asia/Pacific Handsets: Design and Scale are Key*, MorganStanley, 25 February 2003, p.10.

The shift to a digital technology, and the subsequent rise in modularity, led to dramatic changes in the structure of the mobile handset value chain. First, leading original equipment manufacturers (OEM), or branded handset firms, began to increase the degree of outsourcing. This included the procurement of the baseband chipsets from specialised semiconductor vendors such as Texas Instruments (TI), Analog Devices, and Lucent, and

the outsourcing of complete handsets to CM [Imai and Shiu, (2010), p.9]. This allowed the OEM firms to take advantage of the scale and operational expertise of electronics manufacturing service (EMS) firms and the manufacturing and design skills of original design manufacturing (ODM) firms, while at the same time freeing OEM resources to focus on more sophisticated design and branding. In some cases, the OEM simply sold its manufacturing facilities to a CM firm. In others, the OEM demanded that the CM establish a global footprint to support its operations [Sturgeon, (2002), pp.459, 461]. Although outsourcing has become common, it continues to be considerably less than for PCs.[7] In 2005, approximately 30% of handset production was outsourced as compared to 85% for notebook computers [Wilde and de Haan, (2006), p.19]. This difference reflects both the lower degree of standardisation in handset platforms and the higher degree of technical complexity. Each generation of cellular technology requires high investment in research and development (R&D), as well as extensive testing to make sure the different components of the cellular network work smoothly together. Only the OEMs have the resources and expertise to carry out these roles [Wilde and de Haan, (2006), p.20].

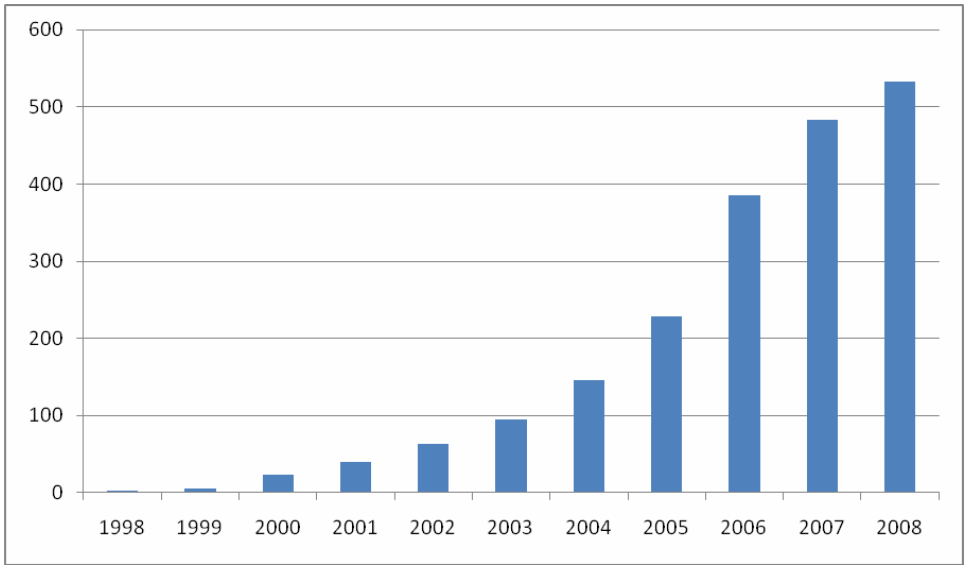
Figure 2 Production of mobile handsets in China (in million units) (see online version for colours)



Notes: We do not have data for unauthorised production prior to 2005. As Figure 7 indicates, it is likely that there was also unauthorised production in 2004 as well.

Source: Source for authorised production data: 1998–2005 is based on MII statistics compiled by Imai and Shiu (2007, p.5); 2006 and 2007 is from Electronic Industry yearbook data cited in Complete Chinese Online Business Information; 2008 is from MII (http://www.miit.gov.cn/n11293472/n11295057/n11298508/11993684.html); 2009 is from 'Special Report – China Mobile Market Analysis', *Business Monitor International*, 25 August 2010.
Source for unauthorised production data: iSuppli estimates in Wang (2010).

Figure 3 Export of mobile handsets from China (in million units) (see online version for colours)



Source: Data for 1998–2005 is based on customs statistics compiled by Imai and Shiu (2007, p.5); 2006 and 2007 is based on Electronic Industry yearbook data cited in Complete Chinese Online Business Information; 2008 is from MII (http://www.miit.gov.cn/n11293472/n11295057/n11298508/11993684.html).

Second, both the OEMs and the CM firms rapidly expanded their manufacturing footprint in China. There are difficulty in estimating this accurately because of a growing grey market, but between 1998 and 2009, the number of mobile handsets produced in China increased from 2.2 million in 1998 (just over 2% of global production) to approximately 750 million in 2009 (approximately 50% of global production), while the number of exports from China increased from 2 million handsets in 1998 to 533 million handsets in 2008 (see Figures 2 and 3).[8]

Third, certain component manufacturers became increasingly powerful in the value chain. A handset potentially consists of hundreds of components, but a relatively small number of these account for the majority of the value (Lee and Gereffi, 2010). One domestic handset firm in China estimated that the chipsets in its phones were 30% of the phones overall cost, the LCD screen was 30%, the casing was 15%, and the battery was 5% (Interview 073109).[9] Even for key components there are distinctions. The analogue and RF chip sets (described above) are all fairly standard and widely available, for example, but the DSP is roughly the equivalent of an Intel processor on a computer. It is responsible for filtering the signal in order to improve call quality (i.e., remove background noise), the data transmission rate, and call stability (Interview 071510). While many firms can develop the capabilities to produce a DSP, producing one of the highest quality (i.e., high call quality, few dropped calls, and low battery consumption) requires a tremendous amount of R&D activity. TI is a dominant supplier of DSPs for 2G phones, in large part due to a collaboration with Nokia, and in 2006 supplied the chips for 58% of the handset market [Park et al., (2009), p.794]. An ARM processor, which uses technology licensed by ARM Holdings in Cambridge, UK, is similarly important.

It powers the applications and user interface on virtually all mobile phones. In short, the value chain for mobile phones increasingly resembles Stan Shih's 'smiling curve' depiction of the IT industry. The high value-added activities are at either end of the value chain, with design (of both handsets and core components) at one end and sales, marketing and service activities at the other end. The low value-added manufacturing assembly activities are in the middle [Hess and Coe, (2006), p.1211; Wilde and de Haan, (2006), p.21]. It is the latter activities that generally take place in China.

Has the shift in global handset manufacturing activities to China created upgrading opportunities for Chinese firms? The dynamics of value chains organised by foreign and domestic handset OEMs can vary widely, and we consider each in turn.

4 Mobile handset value chains in China with foreign lead firms

All of the major global mobile handset OEMs have significant production facilities in China, and output goes to both domestic and export markets.[10] Although China is the dominant manufacturing location for mobile handset value chains targeting global markets it is not necessarily Chinese-owned firms that are doing the manufacturing within the supply chains. Modular production allows multinational firms to establish factories in China in order to take advantage of the low-costs, good infrastructure, and highly developed supply networks that are necessary for manufacturing operations, but as the iPod example illustrates, modularity also allows these firms to locate higher value-added activities elsewhere.[11] As with other electronic products (Koopman et al., 2008), a high percentage of the mobile handset production undertaken by foreign OEMs in China is processing.

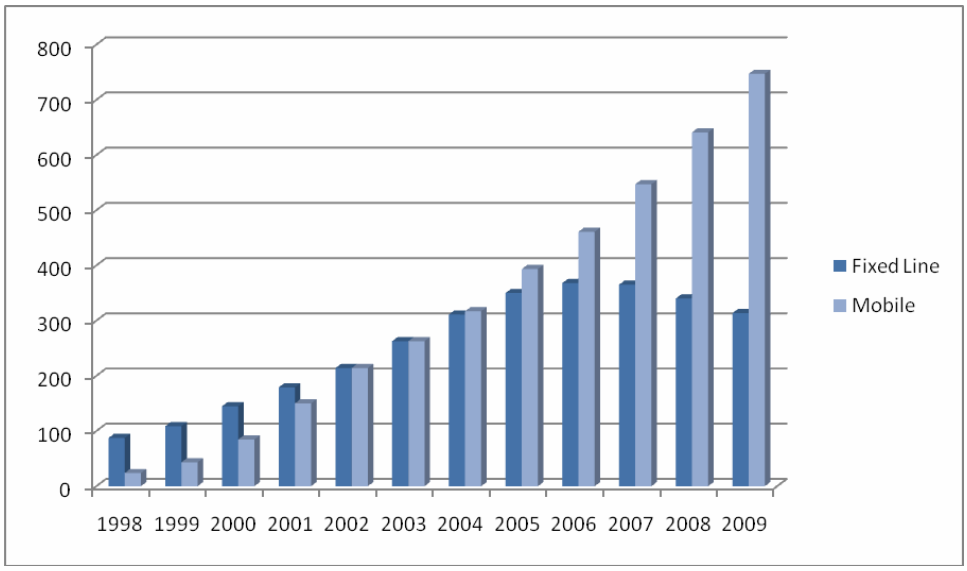
We do not have systematic data on the extent to which Chinese-owned firms play a role in the value chains of foreign OEMs, but interviews with three leading multinational handset firms in China indicate that it is likely to be low (Interviews 072809, 072909, 073009). The extent to which these firms outsource assembly and component production varies, but when they do, the supplier of the chipset is determined by the standard of the phone and will be sourced from an exclusive partner (e.g., Qualcomm for a CDMA phone). More commodity-like components (e.g., LCD screens, batteries, cameras) are sourced from multiple suppliers, but also overwhelmingly foreign. Assembly, when it is out-sourced, is completed by foreign-owned CM firms.[12]

There is good reason to believe that the growth of China's domestic market might lead multinational firms to increase their utilisation of Chinese suppliers. We have argued elsewhere that the increasing importance of the Chinese market offers new possibilities for upgrading for Chinese firms, and supply networks play a central role in this process (Brandt and Thun, 2010). In the automotive sector, for example, the most rapidly expanding segments of the Chinese market are in the low and middle segments of the market, segments that demand products that are significantly different than global markets. In order to compete in these segments, multinational firms must aggressively localise their operations in order to adapt their products and cut costs. Multinational firms have struggled to strike the right balance between what Ghemawat (2007) calls aggregation, the standardisation of products and processes on a global basis so as to

achieve economies of scale and scope, and the need to adapt products and processes for individual markets. Although the incentives for standardisation are strongest in sectors where R&D costs are high, such as autos, the importance of the Chinese market and the unique demands of this market have the potential to change these calculations. When handset manufacturing activities first began to shift to China, the foreign firms were overwhelmingly export-oriented and the size of the Chinese domestic market for handsets was negligible. Within a decade, the rapid increase in the mobile subscriber base in China had transformed the country into the largest handset market in the world (see Figures 4 and 5).

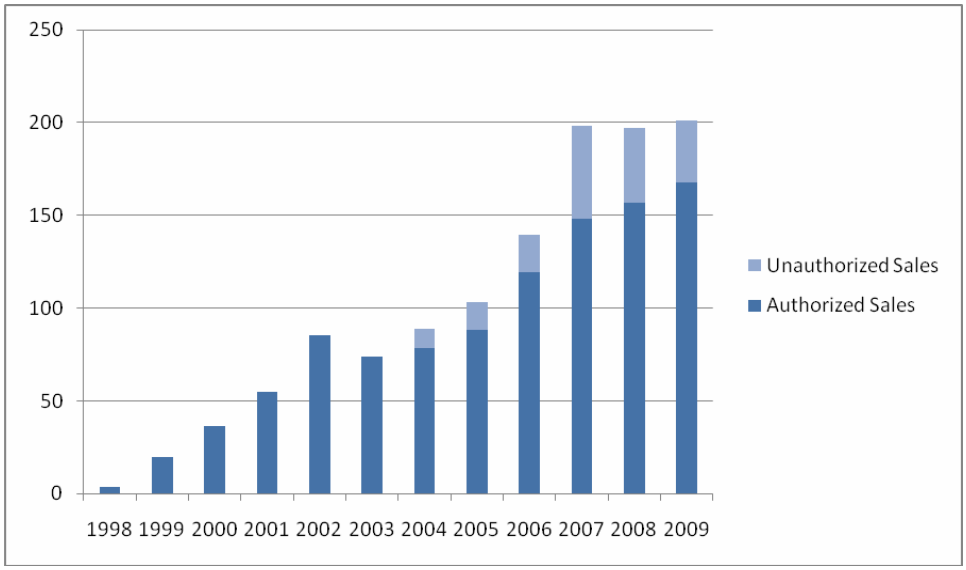
Despite the dramatic rise of the Chinese domestic market for handsets, there is little evidence that multinational OEM producers of handsets change their component sourcing strategy for handsets that are sold in China. This is for three reasons. First, other than minor changes in the user interface, there are not sharp differences in the products demanded by the Chinese market and the global market. The design of a low-end handset for the Indian market is the same as a handset for the Chinese market, and thus the largest savings are generated by maximising economies of scale rather than increasing the use of local suppliers for local models. Second, when alterations to a design are required, such as an input method for Chinese characters, the modular product architecture allows for changes in one module (i.e., software) without any impact on other modules. Nokia's global strategy centred on developing common global platforms (chipset, display, and software) and the economies of scale that this created allowed them to offer prices that were far lower than competing OEMs. And third, low transportation costs for the small, but high value parts and components make importing feasible.

Figure 4 Fixed line vs. mobile subscribers in China (in million subscribers) (see online version for colours)



Source: Hulme-Jones (2010, p. 9)

Figure 5 Sales of mobile handsets in Chinese domestic market (in million units) (see online version for colours)



Notes: Estimates of the size of the grey market for handsets in China vary widely, largely due to differences in the definition of what constitutes a grey market handset. Data on authorised sales can also vary.

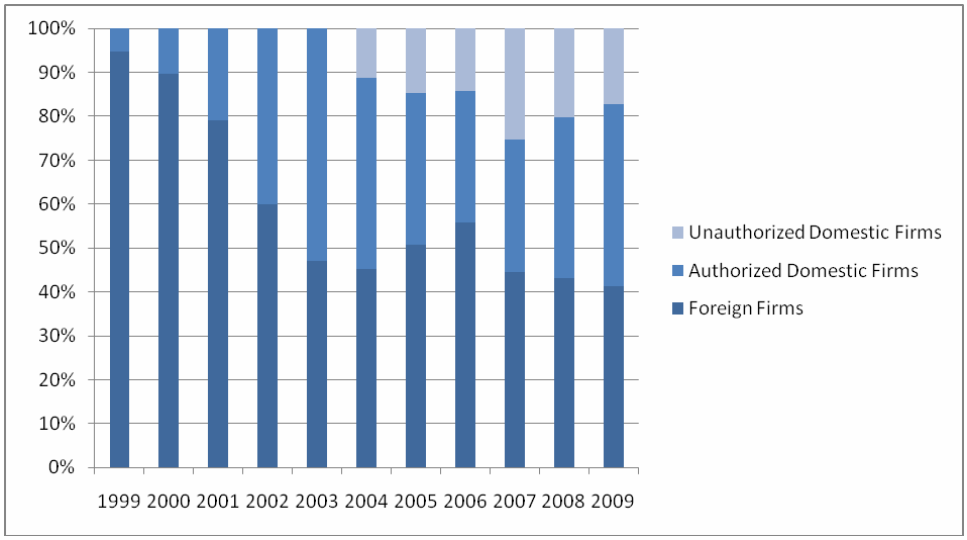
Source: Source for authorised sales data: Data for 1998–2002 is based on Imai and Shiu (2007, p.5) and is calculated according to official statistics (by taking total production in China, subtracting exports, and adding imports); data for 2003 to 2007 is from http://www.eet-china.com/login.do?fromWhere=/ART_8800551071_480101_NT_a2e8cad2.HTM; data for 2008 and 2009 is from the consultancy AVC and cited in 'Special report – China mobile market analysis, Business Monitor Online, 25 August 2010, p.7. Our interpretation of the latter two sources is that the data is for authorised sales.
Source for data on unauthorised sales in domestic market derived from various sources: 2009–2010 is from iSuppli estimates in Wang (2010); 2007–2008 is from iSuppli estimates in 'China's handset market expansion continues in 2009', M2 Presswire, 22 January 2009; 2004–2006 is from Yoshido (2007).

5 Mobile handset value chains in China with domestic lead firms

The most prominent Chinese firms in the mobile handset industry are not suppliers to the multinational OEMs, but Chinese OEMs that are striving to compete with multinational OEMs. These firms have offered new upgrading opportunities within domestic value chains. Over the last decade, Chinese OEMs have rapidly increased their share of the domestic market in two waves: In the first, between 1999 and 2003, the market share of domestic OEMs increased from 5.3% to 52.9%; in the second, between 2006 and 2009, the market share of domestic OEMs increased from 45% to almost 60%, when both authorised and unauthorised domestic firms are included (see Figure 6). In the two

sections that follow, we explain the shift in market share by analysing both the technology and the marketing gap facing firms within the Chinese market. When the endpoint of a value chain shifts to a developing country, both local and multinational firms face potential challenges.

Figure 6 Share of China's domestic mobile handset market (see online version for colours)



Source: Data for authorised and domestic and foreign share is based on Kimura (2009, p.5) for 1999 to 2006 and 'Mobile phones in China: China's handset market expansion continues in 2009', http://www.ciol.com/Technology/Mobility/Feature/Chinas-handset-market-expansion-continues-in-2009/24109115177/0/ for 2008 and 2009 (accessed on 12/7/10). Source of data for unauthorised share is given in Figure 5 above.

5.1 Phase 1: state-managed development, 1999–2004

In the 1990s, the domestic handset market in China was dominated by two foreign OEMs: Nokia and Motorola. As Imai and Shiu explain (2010, p.9), these firms benefited from their involvement in the standard-setting process and the highly developed in-house capabilities that allowed them to master the full range of competencies that the integral product architecture demanded. The most important developmental obstacle for local firms was technological, and joint ventures (JVs) with foreign firms were the chosen means of overcoming these shortcomings. Entry by foreign firms to the domestic market was also restricted to JVs with Chinese state-owned firms. Eastcom Communications (Eastcom Group), which was originally part of the mobile equipment producer controlled by the Ministry of Posts and Communications, formed JVs with Motorola; Panda Electronics, a consumer electronics firm in Nanjing, established a JV with Ericsson. The JVs served essentially as the manufacturing base for the foreign partners, assembling imported components, and were highly profitable. This provided the Chinese partner with a steady (and from their perspective, secure) stream of profits, but they had little

incentive to push aggressively for technology transfer and/or build their own brands and capabilities [Fan, (2010), p.12].

The rapid increase in the size of the domestic market that began at the end of the 1990s (see Figure 5) provided a window of opportunity for local firms. On the technology side, the growth of domestic sales (and even more importantly, the prospects of rapid growth in the future) allowed the central government to take a more aggressive approach with foreign firms. In 1999, the Ministry of Information Industries (MII) announced in Decree No. 5 that all foreign and domestic handset producers were required to apply to the central government for a production licence, and the central government subsequently chose eight JVs and nine domestic producers [Fan, (2010), p.12]. MII used the new policies to pressure foreign firms to increase the extent of technology transfer and localisation, subsidise R&D activities carried out by domestic firms, and block the further entry of foreign firms [Kimura, (2009), p.6]. Sales by foreign firms to the domestic market were also tied to export volumes. As we will explain below, it is not clear that these approaches had any lasting impact.

The domestic firms also narrowed the technology gap with foreign firms by taking advantage of increasing modularity in the product architecture of handsets and outsourcing core design activities. Ningbo Bird, for instance, had done very well manufacturing pagers in the 1990s, but realised at the end of the decade that it would quickly have no market if it did not upgrade to handsets, a far more technologically sophisticated product. The solution was to rely on foreign firms: it formed a JV with Sagem, a French telecommunications firm, but also developed an independent brand with handset designs sourced from Korean design houses and Taiwanese ODM firms.[13] Both sides benefited from the partnerships. The Chinese firms gained access to the designs and technology they did not have and the foreign firms gained access to a market that Decree No. 5 had closed to them [Liu, (2005), p.20; Imai and Shiu, (2007), pp.8–9). According to reports in the Chinese business press, some two-thirds of handsets shipped by local brands during this period were either the designs, knocked-down kits, or finished handsets of Korean or Taiwanese firms [Imai and Shiu, (2007), p.9].

The more important implication of domestic market growth was the emergence of a sizeable marketing gap for foreign firms. Unlike many Western markets, the Chinese market for handsets was open rather than operator-driven, meaning that consumers purchased their handsets separately from a calling plan and effective sales and distribution networks were essential. Large portions of the market were outside of the major cities, and the largest portions of these markets were for very low-end phones. In 2009, the general manager of the marketing department of a leading foreign OEM broke the Chinese handset market into four segments: high-end handsets (above 2,500 RMB) were 6% of the total market, mid-range handsets (between 1,500 and 2,500 RMB) were 14%, low-end handsets (between 600 and 1,500 RMB) were 30%, and super low-end handsets (under 600 RMB) were 50% (Interview 072909). Although we do not have segmentation data for earlier in the decade, if it follows the pattern of other consumer goods, it would have been even larger then. Foreign firms were focused primarily on major cities, and this offered an opportunity for domestic firms in the hinterland.

As Kimura (2009, pp.12–13) explains in detail, the Chinese firms were able to capture market share in the interior of China by building independent distribution systems. The dominant model for foreign firms was to hand-off responsibility for

distribution and sales to the national distributors with whom they had formed relationships during the 1990s. Because these large distributors were unwilling to devote resources to domestic upstarts with uncertain prospects, the Chinese OEMs were forced to develop their own sales channels. The major Chinese OEMs established sales subsidiaries at the provincial level throughout China, and these sales units were used to monitor the behaviour of distributors at the local level (and in particular the choice of sales outlets and pricing). The result was that the domestic firms had a greater ability to control distribution margins (compared to the foreign model which had more layers) and they had more direct access to market information from the sales channels. Ningbo Bird, for instance, had 30 provincial level sales offices, 400 site offices, 15,000 sales agencies, and 2,400 repair centres. TCL had a similar network [Fan, (2010), pp.13–14). The domestic market share of indigenous firms surged to 53% in 2003.

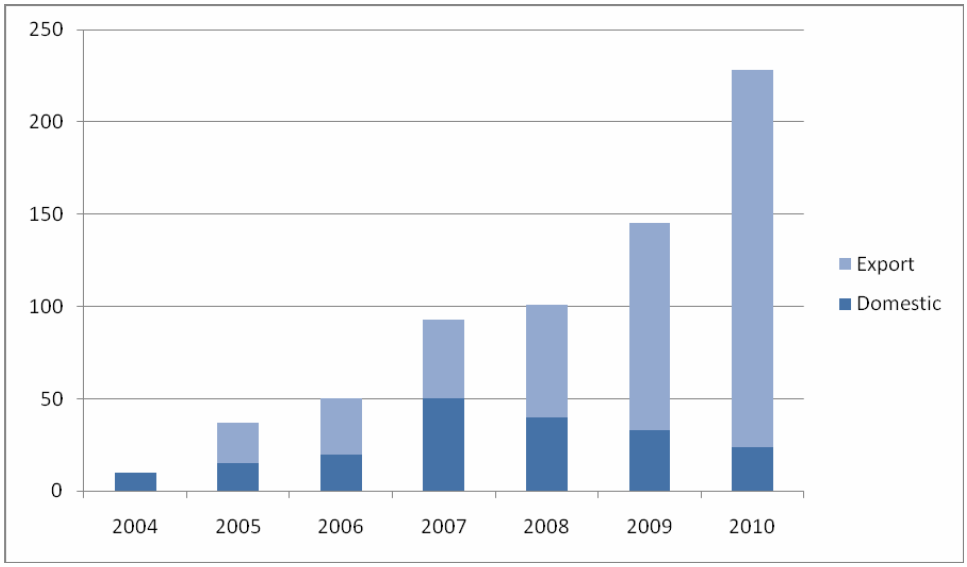
The fall of the domestic champions during this period was as precipitous as their rise, however, and after the peak in 2004, the foreign firms re-captured market share.[14] An important reason is that the leading foreign OEMs were able to close the marketing gap. Nokia, for instance, shifted from an arms-length national distributor to a more comprehensive sales and distribution system that extended to the retail level, albeit with numerous layers in between. In the new system, Nokia was responsible for sales to retailers, although the shipping and financing was handled by a new finance and distribution company, and it trained a sales staff of nearly a thousand to handle this (Interview 072909). Samsung used the network of China Mobile to sell into the low-end of the market. All of the foreign OEMs were able to develop low-end handsets with relative ease. Further complicating matters, the domestic market evolved and consumers began to demand a greater range of functionality on their handsets (i.e., cameras and multimedia features), colour screens became popular, and for reasons we explain below, firms such as Ningbo Bird had trouble responding. In short, the marketing gap faced by foreign firms proved to be easier to close than the technology gap facing Chinese firms. The outsourcing of key components provided respite to the technology gap faced by domestic firms, but the gap widened again when the product technology advanced.

5.2 Phase 2: intense competition, 2005–2010

The decline of the fortunate firms that had secured state production licences in the early stage of growth was partly a result of the actions taken by foreign firms, but equally important was the rapid growth of unlicensed competitors called shanzhai firms. Literally translated as ‘mountain stronghold’, the term shanzhai is meant to connote a bandit that steals market share from more established players by means of its speed and agility. The shanzhai model is often broadly defined in the scholarly literature to include any firm that relies on a high degree of outsourcing, achieves a very short production cycle and low-costs, and has high degree of responsiveness to market demand (Zhu and Shi, 2010), but in the mobile handset sector these attributes apply to virtually all domestic firms (although Huawei and ZTE would be exceptions). It is thus useful to make the further distinction that shanzhai firms (strictly defined) are unauthorised by the government in the sense that they do not have legitimate network identity numbers (which allow a wireless network to recognise a legitimate device) and do not pay taxes. These firms are

able to further lower costs by violating intellectual property rights (IPR), using lower quality components, neglecting to test and certify the handsets, and not offering the customers service or warranties (Interview 090610).

Figure 7 Unauthorised handset production in China, export vs. domestic market sales (in million units) (see online version for colours)



Source: Source for total unauthorised production data: iSuppli estimates in Wang (2010). Source for unauthorised sales in domestic market: see Figure 5. Source for exports of unauthorised handsets is total unauthorised production minus domestic market sales.

Estimates of the size of unauthorised production in China vary widely, due both to differences in how the grey market is defined and difficulties in measuring the shipments of the firms within this market, but by all accounts the growth has been extremely rapid. According to iSuppli estimates, unauthorised production in China increased from 37 million units in 2005 to 228 million units in 2010 (see Figure 7). A growing portion of this production is exported, but the initial focus was generally the domestic market and in 2007, unauthorised sales (in terms of units) in the domestic market were almost as large as sales by authorised domestic OEMs (see Figure 6). The rapid increase in the number of domestic firms competing in the mobile handset sectors, both authorised and unauthorised, was made possible by the erosion of the barrier to entry that had been originally erected by Decree No. 5. In 2004, firms without a licence began to borrow the licenses of licence-endowed firms that were failing. In 2005, the central government replaced the licensing system with a more relaxed approval system [Imai and Shiu, (2007), pp.11–12]. Equally important, however, were changes in the domestic value chains that resulted from increasing codification (and hence increased modularity), the advantages of a large and rapidly growing domestic market, and opportunities in export markets.

Modularity. The increase in modularity in the value chain was the result of advances made by Mediatek (MTK), a fabless Taiwanese semiconductor firm. MTK developed an

integrated solution for handset manufacturers that included both hardware and software. First, it integrated the baseband platform and multimedia (sound and image) data processing on a single chip. This lowered the cost of the chips by reducing their size and allowed the handset manufacturers to add functions to the phone (e.g., an MP3 player) in a highly modular fashion [Imai and Shiu, (2010), p.18). A key differentiator within the baseband chipset is the DSP, and this was a core capability for MTK. This was originally outsourced to Faraday, a Taiwanese fabless IC design firm, but then brought in-house with the acquisition of Analog Devices in 2008. Much of the engineering efforts of the firm were focused on improving the quality of the DSP (i.e., the filtering, digital manipulation, and extensive field testing required to improve call quality) and like a Windows operating system, this is a closed system of software code that cannot be altered or copied by a customer (Interview 071510). As a result of this focus, a 2G handset containing an MTK baseband chipset often had superior call quality to a Tier 1 OEM handset. Second, MTK provided its customers with reference designs for a handset and the software necessary to customise the phone. The software kit included an emulator programme that duplicated the functioning of the handset on a PC and a simulator that allowed the customer to customise the handset software on a computer [Shih et al., (2010), p.5]. The result was a complete turn-key solution: a domestic handset firm could purchase an MTK solution and extensively customise the user interface and functionality, or it could use the basic interface and essentially slap on a casing.

The transformation of the value chain can be seen in the fate of Ningbo Bird. Prior to the introduction of MTK's turn-key solution, a handset manufacturer such as Bird had to deal directly with leading global chip manufacturers such as TI and Philips, and its ability to do so was a source of competitive advantage. TI played a key role in developing GSM technology during the 1990s (in collaboration with Nokia) and was the number one supplier of the DSP for GSM phones. Unlike MTK, TI did not provide a turn-key solution, and Bird invested a great deal in the development of software that was compatible with TI components. Smaller Chinese firms were unable to make similar investments. When MTK emerged, it lowered the barrier to entry for small firms, because it provided a complete and highly modular solution, and it allowed these firms to improve and rapidly change the functionality of the handsets they produced. Bird was hesitant to shift immediately to MTK, partly because it had invested heavily in its collaboration with TI, and partly because it was not clear that MTK would succeed at this point (Interview 080409). TI was also making advances, of course, and developed a series of solutions that decreased the price and size of its chips and increased performance between 2002 and 2005 [Park et al., (2009), p.794], but it was focused on the needs of Tier 1 giants such as Nokia, that were developing leading edge products for advanced markets, and it was not willing to adjust its platform for customers in China that had lower capabilities [Imai and Shiu, (2010), p.17]. Bird did not have deep enough capabilities to keep up with cutting-edge TI technologies, but had enough capabilities to prevent it from immediately adapting the MTK solution that competing firms with virtually no technical capabilities were using. It was quickly overcome by highly flexible domestic firms that were taking advantage of the MTK turn-key solution. Bird, like most of the leading firms from the first period of growth, began to suffer large losses in 2005 and its market share fell rapidly [Imai and Shiu, (2007), p.11; Fan, (2010), p.14]. None of these firms recovered at the OEM level.

The capacity of domestic handset firms to take advantage of the modular solution provided by MTK was supported by the advancing capabilities of independent design

houses (IDHs) in China. Imai and Shiu (2007, pp.14–15) provide a detailed account of the growth of Chinese IDHs in China, and estimate that there were 50 to 60 Chinese firms that were capable of undertaking each step of the product development process for a handset.[15] These firms were able to gradually replace Korean and Taiwanese competitors both because of their lower cost structures and their familiarity with the rapidly changing nature of consumer demand in China.[16] The founder and the core engineers in these firms typically had experience with multinational firms (e.g., Motorola) or the large Chinese equipment manufacturers (e.g., ZTE), and they were able to take advantage of the rapid growth of the domestic market and the proliferation of handset models that this market demanded. Imai and Shiu argue (2007, p.19) that the IDHs were able to benefit from economies of scale in design activities and an incentive structure which led their engineers to be innovative, efficient, and quick. The growth of these firms began in the pre-2005 period, but after their early customer-base declined the IDHs began supporting the new domestic producers that were utilising the MTK solution. The clients of Chinese IDHs are overwhelmingly Chinese OEMs; foreign OEMs are more likely to rely on in-house capabilities for design (and for this reason IDHs are relatively rare in other parts of the world).

Perhaps inevitably, mainland-based Chinese firms have also emerged as competitors to MTK. Spreadtrum Communications was established in 2001 by Chinese returnee engineers from Silicon Valley with support from both Chinese and foreign venture capital, as well as MII. It also offers handset OEMs a turnkey solution for a baseband chipset. According to Imai and Shiu (2007, pp.23–24), the firm's point of differentiation with MTK is that it offers customers greater opportunity for customisation. Spreadtrum cannot match all of the capabilities of MTK – it sources the DSP from CEVA, a Silicon Valley-based firm, rather than producing in-house – but its rapid growth has cut into MTK's market share. In the fourth quarter of 2010, MTK's share of the domestic market for baseband chipsets decreased to 70% (from a high of 85% to 90%), while its net profits in the third quarter of 2010 decreased by 40% compared to a year earlier due to increased price competition.[17]

In short, unlike the foreign OEMs that produced in China, the new domestic OEMs supported an increasingly vibrant network of domestic suppliers. A shanzhai OEM typically will depend on MTK for the chipset and reference designs, IDHs for additional design activities, and a cluster of local suppliers for commodity components. The extent of outsourcing radically shortens the product development cycle and lowers the barriers to entry in the sector. A shanzhai firm may simply consist of ten people operating out of an apartment, for instance; the firm spots a market opportunity, sources components from the electronics markets in Shenzhen, and assembles the phones as long as there is demand. According to some estimates, the number of firms involved in the mobile handset value chain in Shenzhen is between 10 and 30,000 (Tse et al., 2009; Shih et al., 2010). Although overall production growth by shanzhai firms has been rapid, the sector is extremely fragmented: the shanzhai firms have done very well as a group, but the market share of any individual firm is small, with significant turnover of firms in the sector.

Domestic market. The size of the Chinese mobile handset market has grown tremendously during the last decade (see Figure 5), and offered opportunities for both Chinese firms and government policy-makers.

At the firm level, it is important to clarify the exact nature of the advantage that Chinese handset firms enjoy vis-à-vis foreign OEMs within the domestic market,

particularly given the effective response of foreign firms to early weaknesses in their distribution systems.

One obvious possibility is low-cost, and this is often the case, but the advantage should not be overstated. The savings of a Chinese OEM are not in manufacturing cost – the massive global volumes of Nokia allows for economies of scale that no other firm can match – but are in distribution, overhead, design, and the lower margin that the domestic OEM will demand. In a small shanzhai firm these savings are obvious, but it is also true of the leading domestic OEMs. Tianyu, for instance, has a policy of never having more than two layers between the headquarters and the customer. They divide mainland China into nine regions, each a separate profit centre, and within these regions there are multiple distributors within the region that connect to the retail point of sale. This is in comparison to the multi-tiered distribution approach of Nokia (which has distributors at the national, provincial, and county level) which according to Tianyu's estimates, probably adds 100 RMB and two days in distribution time for each unit sold (Interview 090610). On the design side, the savings are tied to the MTK model of a common technical platform for all firms. The common platform allows savings by generating high volumes and allowing OEM firms to reduce design costs (Interview 091010). But again, the cost advantage of domestic firms should not be exaggerated: the ease with which a global OEM can adapt a low-end global phone to the Chinese market makes it very easy for it to compete in the low-end segments of the Chinese market. As Table 1 indicates, Nokia had more ultra low-end handset offerings than any other firm in 2007. Small shanzhai firms that are able to save due to their 'grey market' nature, may have lower costs, but more established domestic firms find they often have to avoid the low-end and compete for mid-range phones (Interview 073109).

Table 1 Product range of leading handset OEM in Chinese market in 2007

Rank	*Vendor brands*	*Output 2007 (10 K units)*	*Output 1Q2008 (10 K units)*	*Model types 2007*	*High-end (> RMB 2,000)*	*Mid-end (RMB 1,000 to 2,000)*	*Low-end (RMB 400 to 1,000)*	*ULC (< RMB 400)*
1	Nokia	10,200	2,485	51	18	13	10	10
2	Motorola	6,376	740	36	11	5	17	3
3	Samsung	6,200	1,250	100	46	36	15	3
4	Sony-Ericsson	4,250	605	33	10	15	6	2
5	ZTE	2,097	550	42		14	20	8
6	LG	1,915	710	44	19	9	9	7
7	Tianyu	1,650	450	79		31	46	2
8	Bird	1,405	210	36	1	16	18	3
9	TCL	1,170	330	26		16	10	2
10	Huawei	1,055	370	24		7	7	10
11	Lenovo	741	120	23	5	12	6	
12	Changhong	560	160	43		5	37	1
13	Haier	535	180	19	2	2	13	1

Notes: – full range or mid/high-end; – strong mid and low-end; and – strong low-end/growing mid

Source: Consulting report (internal)

A second obvious possible advantage of the domestic firm is better familiarity with consumer demand, but this too should not be overstated. A sales manager for Tianyu, for example, argues that the flatter distribution model allows the firm to maintain a close link to the market, and every few months the headquarters holds meetings with key distributors and retailers to find out what customers are looking for in new products (Interview 090610).[18] Despite these strengths, the manager is quick to add that Nokia's knowledge of the Chinese market is among the best. Nokia invests heavily in research, before launching a new product, and in promotion after a product is launched. A top manager for BBK, another leading domestic handset OEM, commented that Samsung's 'feel' for the China market was just as good as his firm's. Samsung had many Chinese managers and also did careful research (Interview 073109).

The advantage of domestic OEMs is an organisational structure that allows them to respond quickly to changes in domestic demand. First, the high degree of modularity and the reliance on outside suppliers allows for a great deal of flexibility. Product development at an established domestic OEM will typically involve an off-the-shelf baseband chipset from MTK, in-house customisation of the user interface (software), and either in-house or an external IDH working on mechanical design. These leading domestic firms will commonly progress from design to manufacturing in three to four months (Interviews 073109 and 090610); small shanzhai firms are obviously much faster. The leading foreign firms have greatly reduced their speed to market – in the past several years was not uncommon – but it is still much longer: Samsung is the fastest at eight months, Nokia is 12 months, and Motorola is 13 to 14 months (interview data). The process may include an initial study on product viability, design preparations and the development of prototypes, lobbying the headquarters in order to get the necessary approvals, and testing and certifications until the product is perfect. Firms that have more centralised operations tend to have slower product development processes (Interview 0672909 and 091010). Second, both the modular approach of the domestic firms and their primary focus on the Chinese market allows them to exploit market niches more effectively than a global firm. These niche handsets (e.g., an Olympic-themed handset in 2008, a phone with a compass pointing to Mecca for the Muslim market, etc.) would not be attractive to a volume-oriented foreign firm with high overhead costs, but can provide strong, albeit short-term, growth for a domestic OEM. This consumer-driven approach to product development can be highly effective for a product that is often more of a fashion accessory than a high-technology product. Tianyu has used this approach to become one of China's leading handset producers, and by the first quarter of 2010 had a domestic market share of 7.5% (Chao, 2010).

At the governmental level, the growth of the domestic market provided an opportunity for the Chinese state to use government policy to promote capability-building within China. The most important was the decision to develop a domestic standard for 3G mobile telecom – time division-synchronous code division multiple access (TD-SCDMA). Although the development of this standard began in the late 1990s, as a collaboration between Datang Telecom and Siemens, its official adaption by MII as a national telecom standard came in January 2006, and was part of a broader initiative in the 11th five year plan (2006–2010) to promote indigenous innovation within China (Zhan and Tan, 2010). Adaption of TD-SCDMA within China would potentially reduce the royalty fees that Chinese companies would otherwise pay to foreign firms for technology licences; adaption of TD-SCDMA abroad would create export markets. The

state funded R&D efforts during the development of TD-SCDMA, both through MII and the Ministry of Science and Technology (MOST), but the most important incentive came through the allocation of licenses: government policy clearly signalled that at least one Chinese operator would be rolling out a 3G network using the TD-SCDMA standard, and this network would require a full range of compatible network equipment and handsets. When 3G licence were finally issued in 2009, the TD-SCDMA licence went to China Mobile, the operator with the largest number of subscribers in the world.

Long delays in the deployment of TD-SCDMA make it unlikely that it will become a dominant standard outside of China – 3G is already a mature standard and 4G is waiting in the wings – and whether it was the most effective policy approach for China is debatable, but it nevertheless has had an impact on the capabilities that have been developed in China. At the OEM level, the domestic standard forces the global firms to shift from a strategy of aggregation to adaptation. Rather than introducing global products with slight changes in the user interface, firms are forced to develop entirely new products if they hope to do business with China Mobile.[19] The benefit of this adaptation is that much of the design and engineering work that relates to the standard is done in China, both within internal R&D units and external IDHs. The artificial barrier of a unique standard helps to foster an ecosystem of firms within China supporting the standard, even if the majority of handsets sold are foreign brands.[20] Spreadtrum has been more successful in capturing market share from MTK in TD-SCDMA, for instance, than in other standards, and has worked closely with domestic OEMs such as Lenovo and Hisense to develop TD-SCDMA handsets. As we explain below, however, the advantages of TD-SCDMA have been larger for Chinese equipment manufacturers.

Export markets. The estimated shanzhai share of China's domestic market peaked in 2007, and has declined since then (see Figure 6). This may be the result of multiple factors: successful shanzhai firms transition from unauthorised to authorised producers as they expand and hence shift categories in the statistics; authorised domestic firms offer the domestic consumer a product that is price-competitive and more reliable than the shanzhai firms; and the government has periodically attempted to crack down on grey market sales within China, but been more relaxed when it comes to exports. As market share at home has declined, and potentially as a result of this decline, shanzhai exports have surged. In 2010, out of a total estimated unauthorised output of 228 handsets, 204 million were exported (see Figure 7). Although we do not have systematic data, these exports seem to be destined primarily to other emerging markets.[21]

6 The shanzhai model – developmental shortcut or dead end?

Modularity allows Chinese OEMs to minimise their weaknesses in technology and maximise the advantages they possess in their home market; as a result, the market share of domestic handset firms (both authorised and unauthorised) has increased (see Figure 6). But the gains have been primarily at the aggregate level: the market share of all domestic firms is very large, but this share is extremely fragmented and very few of the firms will survive. To avoid the fate of a firm such as Ningbo Bird, which saw its impressive market share rapidly erode when the technology shifted and the foreign firms closed their marketing gap, a domestic OEM must either develop internal technical resources necessary to close the technical gap or ensure that its advantages on the marketing/sales side will not rapidly disappear.[22]

On the supply side, the challenge is increasing technical capabilities. The core problem is that the modular solution provided by MTK is a double-edged sword: it allows a domestic firm to easily overcome the technology gap, but because the barrier to entry is lowered for all firms, the result is intense competition and the rapid commodification of handset manufacturing. Foreign OEMs will also source from MTK, but they will rarely adapt a purely modular relationship. LG or Nokia, for instance, seek to differentiate themselves, and have the internal design capabilities to more extensively shape the look, feel, and function of the handset. The OEM designers will define the features that are desired in the handset and then the technical teams from the OEM and MTK will work together to decide which firm carries out which functions – the key criteria being price, capabilities, and the OEM's calculation of what it is willing to share with MTK – and also to optimise the performance of the handset (Interview 090110). Particularly given the emphasis on optimising the interaction of the different components, the transaction (in GVC terminology) is more relational than modular (Gereffi et al., 2005).

The objective of the leading Chinese OEMs is to develop sufficient internal capabilities to allow them to move from a modular transaction with MTK to a relational one. MTK plays a key role in this upgrading process.[23] Tianyu, for instance, was originally a distributor of handsets, and when the licensing restrictions were removed in 2005, the firm was able to rapidly move into the sales of branded 'K-touch' handsets, using a CM and MTK as the provider of the baseband chipset. Tianyu was one of MTK's most important customers in 2006 and 2007, purchasing 10% of its output, and rapidly rising sales volumes at Tianyu brought more technical support from the chipset supplier. On the process side, the emphasis at Tianyu was on quality assurance programs and it began the 'Nokia Program' in 2007, the objective of which was to achieve the performance standards of Tier 1 competitors such as Nokia. Working with MTK engineers, Tianyu set up testing facilities that were needed to improve early problem areas such as the audio performance of handsets and the power consumption.[24] The capabilities that MTK helped the firm to develop – "MTK engineers were the teachers and we were the students", a manager explained – allowed the firm to add features which improved the sophistication of the product. Tianyu, for instance, was one of the first firms in the world to include an 8 megapixel camera in its phone. The 'handshake' that connects the camera to the handset is not simple: as the lens of a camera zooms in and out, sensors must be used to adjust the colour representation and exposure; the user interface of the handset must be adapted so as to be able to control this process; after the photograph is taken, a large amount of data must be transferred to the camera. The MTK modular solution will provide an OEM with the equivalent of a yes/no choice for a camera, but optimisation is really an open question, and this requires the OEM to have both domain knowledge of a camera and a deeper architectural understanding of the MTK platform. The upgrading process at Tianyu involved setting up core teams that developed domain knowledge for different functions and then worked with MTK engineers to optimise performance by customising the MTK platform.[25] Other leading domestic OEMs such as TCL and Lenovo have made similar efforts to bolster their technical and design capabilities.

Progress is clearly being made, but the target is a moving one. Standards are the driver of technology evolution in the handset industry, and the defining characteristic of successive generations of technology is the need to transmit ever larger amounts of data

at ever greater speeds. As a result, the technology of premium handsets is evolving far faster than the upgrading of capabilities in most domestic firms. Innovation within 3G is about improving the customer experience by optimising the handset and its performance: improving phone factor (i.e., a slimmer phone), improving battery life, improving screen resolution, graphic/video capability, etc. Doing this successfully requires the integration of a diverse set of capabilities, including hardware, software, and internet services, and leading firms are increasingly integrating the capabilities that allow them to optimise performance. The application processor, for example, is much more important in a 3G handset that in a 2G handset because the phone is increasingly a mobile computer that must be capable of running a full range of applications. Apple relied on Samsung for an application process, but then started a series of acquisitions aimed at developing independent capabilities in this area. The improved battery performance of successive generations of the iPhone and the smoothness with which the touch screen functions are examples of the benefits that accrue to a company that is able to optimise the performance of different elements of a handset starting in the design phase.[26] The shift in the technology of the product has had a profound impact on competition within the sector, and firms which excelled in 2G have struggled in 3G.[27] Domestic firms in China can count on a large 2G market for a number of years to come – in 2009 less than 5% of the domestic market was for smart phones (Interview 090110) and they can hope for rapid growth in lower-cost 3G smart phones, but they are chasing targets that are rapidly moving ahead.[28]

Upgrading on the supply side is less necessary if a Chinese OEM is able to maintain what Liu (2005) calls 'market-oriented innovation' on the demand side, but the evolution of technology within the mobile market, and in particular the migration to 3G, also affects the structure of demand within the Chinese market. The critical variable is the size of the 'open' market (meaning customers buy their handsets directly from retail outlets) and the operator-driven market (meaning handsets are purchased by a mobile operator and included in a calling plan). The Chinese market is steadily becoming more operator-driven: five years ago 80%–90% of the market was open, currently 60% of the market is open, and most expect that in five years only 35%–40% of the market will be open (Interview 090610).[29] The shift to a more operator-driven model has profound implications for shanzhai firms, given that their core competitive advantage is their ability to respond quickly to the rapidly changing demands of individuals and niche markets.

In an operator-driven market, there are only three customers – China Mobile, China Telecom, and China Unicom – and the greater the share of the market they control, the greater their leverage over the handset manufacturers. This leverage is exerted in the low prices they demand and the demands they place on their vendors.[30] The barriers to entry are also much higher, given that the operators are generally unwilling to work with more than ten handset firms and demand a high level of quality and design customisation, and strong relationships with the operators (and their purchasing departments) are critical (Interview 090610). These barriers will work strongly to the advantage of ZTE and Huawei, the leading equipment manufacturers in China, because they have deep experience working with the operators on the equipment side, and already use these channels for handset sales. Firms such as Tianyu are rapidly shifting their resources from products that are focused on the open market to the product areas that are demanded by the operators and are utilising the design resources that they have developed in cooperation with MTK to launch low-cost models for the operators (Liu and Qin, 2009).

Several of the strongest of these firms will survive, and the primary determinant of their future viability will be the size of the low-end market for smart phones. The barriers will be insurmountable for the vast majority of shanzhai firms. As long as there is an open 2G market, shanzhai firms will survive, but over the long-run, both the evolution of technology in the sector and the nature of demand is working counter to their strengths.

7 Conclusions

Integration in GVCs offers a world of developmental opportunities for firms from developing countries: they gain access to foreign markets and are able to learn from some of the most sophisticated global firms. The far-reaching nature of these opportunities also defines the obstacles these firms face. When the endpoint of the value chain is advanced economies, firms from developing economies are at a disadvantage vis-à-vis lead firms because they have neither the market knowledge nor the leading technologies that these markets demand. Upgrading is a slow and laborious process.

We have argued elsewhere that the distribution of power within a value chain, and in particular the relative power of domestic and global firms, changes when the endpoint of the value chain remains within the home market of a developing country such as China (Brandt and Thun, 2010). In sectors such as autos and construction equipment, the Chinese market is the largest in the world, but foreign firms have difficulty competing in the low and middle segments of this market because of the relatively high cost structure of their products (and the difficulty of altering product designs to overcome this problem) and a weaker understanding of the market. It is the foreign firms that face a marketing gap. Furthermore, the technology gap facing domestic firms is less severe because the domestic market does not demand products of the same quality and technical level as high-income countries. This has two important implications: Domestic firms are able to enjoy natural barriers to entry in these lower-end segments and foreign firms must aggressively localise in order to compete. Both of these factors lead to capability building in Chinese industry.

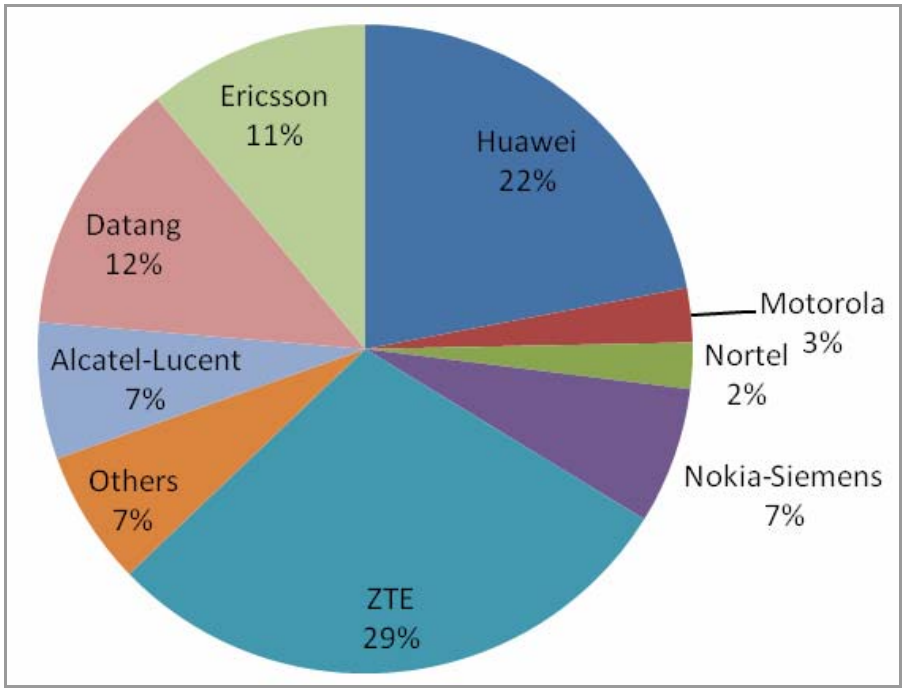
The developmental challenges facing Chinese mobile handset firms are more complicated. On the demand side, domestic firms have enjoyed advantages in their ability to respond to changing consumer demand, but a complete reliance on 'market-oriented innovation' appears to be problematic for two reasons. First, the highly modular product architecture of a mobile handset allows foreign firms to easily adapt their global products for the Chinese market and compete aggressively in all segments. The overall similarity between a low-end phone sold in China and other developing countries reduces the need for localisation. Second, the structure of the Chinese market is shifting toward one that is more operator-driven, which favours the handset OEMs that have the relationships and resources to collaborate with the large state-owned operators.

The technology of the mobile handset, and in particular the modularity in product design, has proven to be a mixed blessing for domestic firms. The modular product architecture provides domestic OEMs a shortcut to product upgrading, because the core technology can be outsourced, but this also leads to intense competition within the sector. Given the difficulty in maintaining a source of competitive advantage in marketing, branding, and/or distribution, the leading firms must invest in the design capabilities that will allow them to move towards more relational transactions and product and process

upgrading. Early success in either the domestic market or export markets can provide the revenue necessary to fund technical upgrading. The rapid rate of technical change in the industry makes this process extremely difficult, however. The danger is that the technology will evolve more rapidly than capabilities can be developed.

The importance of these factors is highlighted by the comparison to the telecom equipment sector. In contrast to the waves of rising and falling market share of Chinese handset firms, the rise of leading Chinese equipment manufacturers has been steady and seemingly inexorable. Within 15 years of the start of JV production of digital switching systems for fixed line networks in 1986, domestic Chinese manufacturers had surpassed JVs in terms of market share [Harwit, (2007), p.319]. This story was repeated in the 2G equipment market. Even more telling, domestic equipment manufacturers now find themselves in positions of market leadership with the rollout of 3G networks in China. In 2008, ZTE captured 29% of China's 3G wireless equipment market, Huawei had 22%, Datang 13%, and Ericsson was a fourth with 11% (see Figure 8). Perhaps most significantly, the success of the two leading firms has been equally impressive in export markets.

Figure 8 China 3G wireless equipment market share in 2008 (see online version for colours)



Source: iSuppli (2009)

There is a large literature on the growth and success of Chinese equipment manufacturers, especially as it relates to digital switching equipment, and here we would only like to highlight several comparisons to the handset industry. On the supply side, the characteristics of the technology made the upgrading challenges slightly less severe than in the case of handsets. Most importantly, the rate of technical change was slower, giving domestic firms a larger window within which they could invest in upgrading their

technical capabilities. The digital switching technology that Chinese firms were acquiring in the 1980s was relatively mature, but it nevertheless would remain the dominant technology for fixed-line networks for several more decades [Mu and Lee, (2005), p.762].[31] Shen (1999) points out that some of the home-grown technology for digital switches was highly modular compared to the more integral product architecture of the systems of the JVs. As in the case of handsets, this helped to lower sourcing costs and lowered the barriers to entry for domestic firms, but the longer and more predictable life-cycle of switching technology extended the period over which knowledge acquisition and learning by local firms could occur, and over which investments in R&D, human capital, and equipment could be amortised. Ningbo Bird, by contrast, invested heavily in relationships with TI as a core supplier, only to find the entire structure of the industry transformed by MTK's modular solution.

On the demand side, the segmentation of the domestic market provided Chinese firms with large and growing lower-tier markets, but the advantage of this segmentation appears to have been more durable for equipment manufactures because the product modifications that foreign firms had to make in order to compete in the lower-tier markets were more significant than those that were required by a global handset OEM. First, with proficiency in English much less common, a machine operator interface with a Chinese language screen menu was essential. Second, switches produced by the JVs were much less robust to problems in transmission lines and transmission quality, which early on was a common problem in the lower-tier networks. And third, foreign systems were designed around the assumption of low usage of individual lines, which was not the case in China. Aware of these shortcomings, Chinese firms tailored their products to meet these requirements (Mu and Lee, 2005). Success in these markets provided firms with the revenue needed to fuel growth and an opportunity to learn-by-doing. The Chinese state was also better able to tilt the playing field to the advantage of domestic firms, through the procurement policies of the operators and the provision of customer finance by state-owned banks. In handsets, the foreign firms were able to overcome their marketing gap in 2004 and 2005 through the diligent construction of distribution and sales networks, but on the equipment side the market is always operator-driven, and the state-owned operators are more responsive to state policy.[32]

Inherent in this policy approach is the danger of fostering firms that are only capable of competing in the policy-supported environment of the domestic market, but the continual presence of strong competition from foreign firms within the Chinese market seems to have ameliorated this concern. Although it is difficult to determine whether outcomes would have been different in the absence of supportive government policies, it is clear that firms such as Huawei and ZTE can now compete in virtually any market. On the handset side, the government has traditionally been less able to influence purchasing (and TD-SCDMA has only recently had an impact), but it is interesting to note that two of the most powerful firms that have emerged in this market are Huawei and ZTE. In the past, these firms enjoyed more stable demand for handsets because they 'bundled' them with equipment orders. In the future, as the market becomes more operator-driven, they will enjoy the benefits of strong relationships with the operators. Growing demand and high volumes (in both equipment and handsets) facilitated investment in the design capabilities that are necessary to keep up with the rapidly changing handset technology, but the target is still an elusive one. The advantages that a Chinese firm enjoys in its home market offer opportunities, but no guarantees.

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Notes

1 Out of the 750 million, 600 million represents 'official' or authorised production. This estimate of authorised production is taken from 'Special Report – China Mobile Market Analysis', *Business Monitor International*, 25 August 2010. iSuppli, a leading source of market information for the sector, estimates that the volume of unauthorised production in 2009 was 145 million (Wang, 2010).

2 We arrive at this figure by adding iSuppli's estimate of the grey market shipments within China (33.2 million) in 2009 to the sales estimates of the local consultancy AVC (168 million) cited in 'Special Report – China Mobile Market Analysis', *Business Monitor Online*, 25 August 2010, p.7.

3 Linden et al. (2007) estimate the value added at each stage of the supply chain by estimating the sales prices of that stage's output and subtracting the cost of all purchased inputs.

4 The global commodity chains and GVC literature do not make assumptions about the geographic location of particular nodes of the chain. Applebaum and Gereffi, for instance, explicitly define the 'core' as the regions where the core activities (i.e., those that are most profitable) are spatially concentrated rather than particular regions or countries of the world. The dominant development strategy during the period these frameworks were being

formulated, however, was export-led growth, and the target markets were in the developed world.

5 In developing a typology of value chain governance, Gereffi et al. (2005, p.85) acknowledge the role final markets play in determining the strength/weakness of capabilities of local suppliers in developing countries. They point to the Keesing and Lall argument that export markets will have requirements that do not (yet) apply to the home market of the supplier, and hence there is an inevitable gap between these firm's capabilities and the demands of the final market.

6 The description of the network that follows is based on Ghemawat (2004, p.1).

7 Although almost all brands utilise CM, the extent varies. At one end of the spectrum, Samsung produces the bulk of its handsets in-house and Nokia produces about 80% in-house. At the other end of the spectrum, Sony-Ericsson outsources the majority of its production [Hess and Coe, (2006), p.1219].

8 The problem of the grey market only affects production figures. Chinese customs data are believed to include handset exports by unauthorised firms.

9 In this particular example, the cost of the screen is inflated because this firm was trying to differentiate itself based on the high-quality appearance of its handsets. A foreign firm estimated its screen to be 20% of overall costs (Interview 072909).

10 In 2008, 83% of authorised exports were from foreign-invested OEMs. 'China's cell phone industry', *TMCnews* available at http://www.tmcnet.com/usubmit/2009/03/10/4042685.htm (accessed on 10 March 2009).

11 Many electronic products that are exported out of China involve processing activities (i.e., importing components, assembling in China, and then exporting final products). According to the analysis of Koopman et al. (2008, p.25), 99% of Chinese computer exports in 2002 were the result of processing, and the domestic value-added in these exports was 3.9%.

12 It should be noted that Taiwanese firms operating in the mainland are considered as foreign firms because this is how they are considered in Chinese statistics. Thus, a company like Foxconn is considered to be a foreign-invested enterprise rather than a domestic Chinese firm.

13 It is worth noting that in order to acquire a license for handsets, Ningbo Bird had to change from a *minying* firm with mixed ownership into a state-owned firm. This enabled it to acquire the licence for handsets and the bank financing that it required (Interview 080409).

14 In absolute terms, the reduction in sales by the established domestic firms was likely very small. The reduction in their market share arose from their difficulty in capturing any of the increase in sales.

15 The process that Imai and Shiu outline for the development of a typical 2G handset is: product definition (selection of platform, definition of product concept and functions, selection of key components), product design (exterior, mechanical, hardware and software), pilot production and review, testing and acquisition of necessary certifications, and preparation for volume production. Their estimates of the number of Chinese IDHs that can complete this process is based on reports from iSuppli and other sources. In addition to these firms, some 300 to 500 smaller IDHs are able to undertake parts of this process (i.e., exterior or mechanical design).

16 Imai and Shiu (2007, p.17) note that 2G design is a 'knowledge-labour-intensive' activity that requires a few highly skilled engineers but then many more relatively unskilled engineers, particularly for software design.

17 Market share data is from 'MTK losing shares to emerging chip makers', www.163.com, 2 November 2010 and net profit data is from Lisa Wang, 'MediatTek Q3 profits disappoints', *Taipei Times*, 2 November 2010.

18 On the contrast between the distribution channels of foreign and local firms, see also Kimura (2009, pp.12–13).

19 Interestingly, although a new domestic standard in many respects levels the technical playing field, it did not necessarily create an advantage for domestic OEMs vis-à-vis foreign OEMs given that the domestic firms have very limited internal design capabilities (and typically rely

on external suppliers for a solution). In fact, realising that the standards would not succeed unless consumers had a large variety of compatible handsets to choose from, the government allowed foreign firms to receive funding from a RMB 640 million fund set up to finance R&D efforts in TD-SCDMA (Interview 072809).

20 At the beginning of 2010, Samsung controlled 53.8% of the TD-SCDMA market in China.

21 According to one estimate, 60% of shanzhai exports are destined for India, Southeast Asia, Latin America, and Africa. 'Makers of grey handsets face an opportunities-full environment', *Global Times*, 10 November 2010.

22 The growth of a large but highly fragmented shanzhai sector suggests that its contribution to upgrading in the sector may have been as much to upstream firms like Spreadtrum that provide key parts and components.

23 This paragraph is based on Interviews 091010 and 090610.

24 By 2010, out of 1,600 Tianyu employees, 600 worked in the design department.

25 MTK sent 30 to 40 engineers to work with Tianyu engineers for a six-month period as part of Tianyu's efforts to upgrade the camera on its phones. MTK's willingness to commit these resources to customers is a core advantage over competitors with superior technology (such as Qualcomm).

26 Not of least significance, optimising performance also allows a firm to lower costs by lowering the bill of materials. A phone with poor performance will require more memory and larger batteries, for instance.

27 Nokia's traditional strength, for instance, has been in hardware and it has thus far been unable to master the new demands of the smart phone segment. Since the launch of the iPhone, its market capitalisation has fallen by almost two-thirds. MTK also faces problems. It currently outsources the application processor, but this means it cannot optimise performance sufficiently, and without this ability, gaining Tier 1 customers is difficult.

28 Note that the 'smart' designation indicates that a phone can handle e-mail (in contrast to a 'feature' phone) and can be either 2G or 3G. 3G refers to the amount of data that can be transmitted and the speed of transmission. There are indications that the smart phone segment is growing quickly. In the last quarter of 2010, 28% of handset sales in China were smart phones. 'China handset sales hit 67.59 mln – study', *Telecompaper Asia*, 24 January 2011.

29 The primary reason 3G tends to be more operator-driven is technical. Data plays a central role in 3G and it is important that the handset be coordinated by the operator in order for it to function properly. For example, a particular application might be altered depending on whether the screen of the phone is square or rectangular. If the handset does not work properly, the complaints are to the operator rather than the handset manufacturer, so the operator will want to either work with particular handset firms or at least certify appropriate models. An open sales model is too chaotic. An operator-driven model also speeds up the migration to 3G (and thereby justifies the investment in the infrastructure) because operators can subsidise the sales of handsets (Interview 100110).

30 One sales manager at a domestic handset firm described how an operator would demand 10,000 handsets by the end of the week, demand an immediate response, and then cancel the order the day before the deadline (Interview 090610).

31 The third generation in switching technology dates from the early 1960s when analogue store programme control (SPC) switches were introduced. Digital SPCs came to the market in the early 1970s.

32 It should be noted that state interests can conflict. In the case of digital switching equipment, the Ministry of Post and Telecommunications, which had responsibility for building the fixed-line network, was the local partner in the leading JV, namely, Shanghai Bell. Procurement decisions for switching equipment were highly decentralised at the provincial level however, which may have worked to Huawei's advantage.

Global value chains in the automotive industry: an enhanced role for developing countries?

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Abstract: In this paper, we apply global value chain (GVC) analysis to recent trends in the global automotive industry. We focus on how the recent economic crisis has accelerated pre-crisis trends towards greater importance of the industry in the developing world. The regional structure of production in the industry has largely confined the impact of the crisis within each major producing country/region. Opportunities to move up in the value chain for suppliers in emerging economies have proliferated and are likely to become even stronger now that an increasing number of new models are developed specifically for local markets. While it appears that some large developing countries, especially China and India, are gradually gaining more independence and autonomy as their industries and markets gain size and importance, supplier countries such as Mexico and countries in East Europe remain as dependent appendages of adjacent regional production systems.

Keywords: outsourcing; automotive parts and assembly; global suppliers; China; India.

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1 Introduction

This paper provides an overview of global value chains (GVCs) in the automotive industry, analyses the role of developing countries in global production and consumption, examines changes associated with the recent economic crisis and government responses, and provides a picture of where the industry is headed, particularly in light of the increasing importance of both production and consumption in large developing countries such as China and India.

Section 1 highlights three important ways in which the organisation of GVCs in the automotive industry differs from other industries. First, the export of finished vehicles to large mature markets is effectively limited by political considerations. Second, the product architecture is of integral nature, leading to thick 'relational' linkages between lead firms and Tier 1 suppliers, whose role in the industry is more important than in the past. Third, because of these first two features, the organisation of production has remained more regional than global.

Section 2 briefly summarises industry-specific government responses to the recent economic crisis, focusing on mature markets, especially North America and Europe. We mention these interventions because they lay bare the influence politics has on the industry, and vice versa. These policies will continue to affect the industry as market growth (and hence production) shift to developing countries and local firms begin to compete more directly with multinational firms in developing countries and in world markets.

In Sections 3 and 4, we focus our analysis on the position and role of developing countries in the industry. We provide an overview of the different roles that developing countries play in automotive GVCs, and compare the development paths and role of domestic firms in China, India, and Mexico. These three countries have relied – to varying degrees – on foreign direct investment by lead firms from mature economies to jump-start their industries. Two features of the Chinese industry,

1 the leveraging of a well-developed supply base both locally, in Shanghai, and abroad

2 a domestic market that is sufficiently large to spur the development of vehicles tailored to local tastes, position that country best for future development.

In Section 5, we summarise our insights and provide some policy recommendations for the industry in developing countries.

2 GVCs in the automotive industry[1]

We begin with an overview how GVCs in the automotive industry are structured. We highlight the strong regional organisation of production, the growing importance of globally engaged suppliers, and the persistence of 'relational' linkages between lead firms (i.e., the automakers) and first tier suppliers.

2.1 The evolution of GVCs in the automotive industry

In other writing, we have argued that the automotive industry is neither fully global, consisting of a set of linked, specialised clusters, nor tied to the narrow geography of nation states or specific localities, as is the case for some cultural and service industries (Sturgeon et al., 2008). Global integration has advanced as firms have sought to leverage engineering effort across products sold in multiple end markets. And, as suppliers have taken on a larger role in design, they have established their own design centres close to those of their major customers to facilitate collaboration. On the production side, the dominant trend is regional integration, a pattern that has been intensifying since the mid-1980s for both political and technical reasons. In North America, South America, Europe, Southern Africa, and Asia, regional parts production tends to feed final assembly plants producing largely for regional markets. Political pressure for local production has driven automakers to set up final assembly plants in many of the major established market areas and in the largest emerging market countries, such as Brazil, India, and China. Increasingly, lead firms demand that their largest suppliers have a global presence as a precondition to be considered for a new part (Sturgeon and Florida, 2004). Because centrally designed vehicles are manufactured in multiple regions, buyer-supplier relationships typically span multiple production regions.

Within regions, there is a gradual investment shift toward locations with lower operating costs: the Southern America and Mexico in North America; Spain and Eastern Europe in Europe; and South East Asia and China in Asia. Ironically, perhaps, it is primarily local firms that take advantage of such cost-cutting investments within regions (for example, the investments of Ford, GM, and Chrysler in Mexico; and Volkswagen and Peugeot in Eastern Europe), since the political pressure that drives inward investment is only relieved when jobs are created within the largest foreign markets (for example, Japanese automaker investments in North America and Europe have been concentrated in the USA, Canada, and Western Europe). Automotive parts, of course, are more heavily traded between regions than finished vehicles. Within countries, automotive production and employment are typically clustered in one or a few industrial regions. In some cases these clusters specialise in specific aspects of the business, such as vehicle design, final assembly, or the manufacture of parts that share a common characteristic, such as electronic content or labour intensity. Because of deep investments in capital equipment and skills, regional automotive clusters tend to be very long-lived.

To sum up the complex economic geography of the automotive industry, we can say that global integration has proceeded the farthest at the level of buyer-supplier relationships, especially between automakers and their largest suppliers. Production tends to be organised regionally or nationally, with bulky, heavy, and model-specific

parts-production concentrated close to final assembly plants to assure timely delivery (for example, engines, transmission, seats and other interior parts), and lighter, more generic parts produced at a distance to take advantage of scale economies and low labour costs (for example, tyres, batteries, wire harnesses). Vehicle development is concentrated in a few design centres. As a result, local, national, and regional value chains in the automotive industry are 'nested' within the global organisational structures and business relationships of the largest firms.

2.2 The increasing role of large suppliers

One of the main drivers of global integration has been the consolidation and globalisation of the supply base. In the past, multinational firms either exported parts to offshore affiliates or relied on local suppliers in each location, but today *global suppliers* have emerged in a range of industries, including motor vehicles (Sturgeon and Lester, 2004). Since the mid-1980s and through the 1990s, suppliers took on a much larger role in the industry, often making radical leaps in competence and spatial coverage through the acquisition of firms with complementary assets and geographies. Supplier consolidation at the worldwide level has not progressed as far as in North America, but it has picked up speed in recent years as the formation of new global lead firms and groups, such as DaimlerChrysler in 1999 (a deal that was undone in 2007), Nissan-Renault in 1998, and Hyundai-Kia in 1999 lead to some slow and partial consolidation and integration of formerly distinct supply bases. With the recent economic crisis, some of these acquired companies are now being sold off, Saab and Volvo are two examples, partially reversing this trend. On the other hand, some of the industry's largest mergers, such as the alliance between Renault and Nissan, appear to be quite stable.

As automakers set up final assembly plants in new locations and tried to leverage common platforms over multiple products, and in multiple markets, they pressured their existing suppliers to move abroad with them. Increasingly, the ability to produce in all major production regions has become a precondition to be considered for a project. However, what is emerging in the automotive industry is more complex than a seamless and unified global supply base, given the competing pressures of centralised sourcing (for cost-reduction and scale) and regional production (for just-in-time and local content). The need for full co-location of parts with final assembly varies by type of component, or even in stages of production for a single complex component or sub-system. Suppliers with a global presence can try to concentrate their volume production of specific components in one or two locations and ship them to plants close to their customers' final assembly plants where modules and sub-systems are built up and sent to nearby final assembly plants as needed.

What should be clear from this discussion is that the economic geography of the automotive industry cannot be reduced to a set of national industries or a simple network of clusters. Business relationships now span the globe at several levels of the value chain. Automakers and first-tier suppliers have certainly forged such relationships, and as the fewer, larger suppliers that have survived have come to serve a wider range of customers, these relationships have become very diverse. With consolidation and crisis, we must question the staying power of smaller, lower-tier, local suppliers, however well supported they are by local institutions and inter-firm networks, especially since many upstream

materials suppliers, such as the automotive paint supplier PPG, are also huge companies with global operations.

2.3 Why regional production?

Since the late 1980s, trade and foreign direct investment have accelerated dramatically in many industries. Specifically, a combination of real and potential market growth with a huge surplus of low-cost, adequately skilled labour in the largest countries in the developing world, such as China, India, and Brazil, has attracted waves of investment, both to supply burgeoning local markets and for export back to developed economies. The latter has been enabled and encouraged by the liberalisation of trade and investment rules under an ascendant World Trade Organization (WTO). Yet regional production has remained very durable in the automotive industry. Because lead firms in the automotive industry are few in number and very powerful, they have the strength to drive supplier co-location at the regional, national, and local levels for operational reasons, such as just-in-time production, design collaboration, and the support of globally produced vehicle platforms. But politics also motivates lead firms to locate production close to end markets, and this creates additional pressure for supplier co-location within regional-scale production systems.

While consumer tastes and purchasing power, driving conditions, and the nature of personal transportation can vary widely by country, local idiosyncrasies in markets and distribution systems are common in many industries, and it is possible to feed fragmented and variegated distribution systems from centralised production platforms, as long as product variations are relatively superficial. The continued strength of regional production in the automotive industry, then, is one of its most striking features (Lung et al., 2004)[2]. The regional organisation of vehicle production stands in stark contrast to other important high-volume, consumer-oriented manufacturing industries, especially apparel and electronics, which have developed global-scale patterns of integration that concentrate production for world markets in fewer locations (see the papers of Frederick and Gereffi on the apparel GVC and of Sturgeon and Kawakami on the electronics GVC in this special issue).

Why is political pressure for local production felt so acutely in the automotive industry? The high cost and visibility of automotive products, especially passenger vehicles, among the general population can create risks of a political backlash if imported vehicles become too large a share of total vehicles sold. This situation is heightened when local lead firms are threatened by imports. In our view, the willingness of governments to prop up or otherwise protect local automotive firms is comparable to industries such as agriculture, energy, steel, utilities, military equipment, and commercial aircraft. As a result, lead firms in these industries have adjusted their sourcing and production strategies to include a large measure of local and regional production that firms in other industries have not. This explains why Japanese, German, and Korean automakers in North America have not concentrated their production in Mexico, despite lower operating costs and a free trade agreement with the USA (Sturgeon et al., 2008)[3]. Japanese automakers have also shifted European production to Eastern Europe later and less aggressively than US and European lead firms, and have even moved to China later than their European and American competitors have[4].

3 The impact of the economic crisis

The recent economic crisis has been felt intensely in the automotive industry, prompting governments around the world to intervene on a large scale[5]. The impact of the 2008–2009 economic crisis on the automotive industry has been more severe than for any other industry except housing and finance. There are several reasons for this. First, the industry, especially the value chains led by the US Big 3 automakers (General Motors, Ford, and Chrysler), was already in a dire situation. For companies already on life-support, the freezing of credit markets meant cancelled orders, unpaid supplier invoices, and 'temporarily' shuttered plants. Huge debt loads, high fixed-capital costs, high labour costs, and immense pension and healthcare commitments to retirees added to the immediacy of the damage. Second, the high cost and growing longevity of motor vehicles prompted buyers to postpone purchases that they might have otherwise made. Consumers, especially in the world's largest national passenger vehicle market, the USA, found it difficult to obtain loans for purchase and, driven by fear of job loss, moved aggressively to increase their rate of saving. Vehicle sales plunged and as a result, beginning in the fall of 2008, pushing the industry into its most severe crisis since the great depression.

Because of the co-location of assembly and parts plants in national and regional production systems, the effects of the crisis have been largely contained within each country/region. For example, the largest sales decline was experienced in the USA. While this had a dramatic effect on parts imports, which declined at an average annual rate of 20.2% over the 2008–2009 period (US International Trade Commission), the more severe impact of the crisis in the USA was on assembly and parts plants within North America, some of which not only ceased importing parts, but temporarily or even permanently closed.

In this environment, the US Congress, supported by a new administration unwilling to preside over the liquidation of the country's largest manufacturing industry, offered several waves of bailouts, but only after a series of humiliating Congressional hearings where Big 3 CEOs made the case for government assistance and were aggressively cross-examined about management's culpability for the crisis. In the aftermath, General Motors' CEO resigned and the company was forced to file for Chapter 11 bankruptcy. Chrysler also filed for bankruptcy, and narrowly avoided a break-up through partial liquidation and sale of its more lucrative assets to the Italian automaker Fiat, which is providing technology and management support in an effort to restructure the company to make it viable again. While it is widely believed that Ford has not yet asked for or received government assistance, the company did accept a $5.7 billion 'retooling loan' from the department of energy to develop more fuel-efficient cars and trucks in June 2009.

In Europe too, bailouts were provided, but in different ways. Credit support and loan guarantees were given directly to troubled firms. Scrappage or environmentally-motivated subsidies were given to consumers to boost industry sales and help firm indirectly. While the USA provided a total of $3 billion at $4,500 per vehicle as long as a new vehicle was purchased, the old one was scrapped, and the fuel efficiency improved by five miles per gallon or more, Germany launched the largest programme, allocating €4.5 billion, but replaced vehicles had to be at least ten years old to qualify. In Belgium and France the subsidy increased with the fuel efficiency of the new vehicle and the old vehicles did not have to be scrapped. In China, the government instructed banks

to provide easier credit and dropped the sales tax on vehicles with engine sizes of less than 1.6 litres.

4 The shift to developing countries

In spite of the recent and dramatic effects of the 2008–2009 economic crisis on the automotive industry, it is important to begin with a longer-term perspective. In our view, recent events will serve to hasten long-term trends, most notably:

1 the shift of automotive production to developing countries, where sales growth is strongest

2 consolidation in the global supply base and in final assembly

3 the internationalisation of automakers from developing countries (e.g., the Chinese state-owned automaker Geely's take-over of Ford's Swedish car unit, Volvo).

We start by discussing the automakers and follow up with parts suppliers below.

Table 1 Total vehicle production levels and growth in countries producing one million or more units in 2007 (in thousands)

	2002	*2007*	*Annual growth 2002–2007 (%)*	*2009*	*Annual growth 2007–2009 (%)*
Russia	1,220	1,660	6.4%	722	–34.0%
USA	12,280	10,781	–2.6%	5,709	–27.2%
Canada	2,629	2,579	–0.4%	1,491	–24.0%
UK	1,823	1,750	–0.8%	1,090	–21.1%
Italy	1,427	1,284	–2.1%	843	–19.0%
France	3,602	3,016	–3.5%	2,048	–17.6%
Japan	10,257	11,596	2.5%	7,935	–17.3%
Mexico	1,805	2,095	3.0%	1,561	–13.7%
Spain	2,855	2,890	0.2%	2,170	–13.3%
Thailand	585	1,287	17.1%	999	–11.9%
Turkey	347	1,099	26.0%	870	–11.1%
Germany	5,469	6,213	2.6%	5,210	–8.4%
South Korea	3,148	4,086	5.4%	3,513	–7.3%
Brazil	1,792	2,977	10.7%	3,183	3.4%
India	895	2,254	20.3%	2,633	8.1%
China	3,287	8,882	22.0%	13,791	24.6%

Source: Data are taken from the International Organization of Motor Vehicle Manufacturers

In Table 1, we list the countries where more than one million vehicles were produced in 2007, ranked by annual production growth rates over the 2007–2009 period – negative for all but three countries. It is clear from this table that the crisis-induced contraction of production has been most pronounced in countries that have experienced the slowest rate of production growth over the preceding five years. The table also shows China, where

the rebound in sales has been particularly strong, surpassing the USA and Japan as the number one auto producing country in the world. Looking at these trends and considering further plant closures in North America (possible) and Europe (likely), we have to conclude that at least part of the current production decline in mature markets is likely to be permanent and that China will soon occupy the top spot and keep it for the foreseeable future.

The overall structure of the post-crisis industry is still taking shape, as many firms have yet to liquidate, fully complete their bankruptcy restructurings, or avoided bankruptcy with certainty. Only after the announced planned closures and capacity reductions have been carried out will alterations in global market share and the relative weight of the industry in different regions become apparent. The likely four market share leaders: in order, Toyota, Volkswagen, Ford, and Hyundai, will signal a remarkable break from the industry's – even recent – past. Furthermore, the ascent of Chinese companies and India's Tata into the top 20 is likely to have far-reaching consequences.

The industry's growth in the developing world has been limited to a specific subset of countries. Political pressure to build vehicles where they are sold, discussed earlier, combined with very high minimum economies of scale for true 'integrated' production means that market size dictates the potential for the industry's growth. The impact of market size is manifest in four ways. First, even when existing vehicle designs are used as a basis, it is only profitable for lead firms to tailor final products to fit consumer tastes in very large markets (Brandt and Van Biesebroeck, 2008). This has happened in China, India, and Brazil, but in few other developing countries. In these countries lead firms have established local design, engineering, and regional headquarter facilities. Once automakers set up these local technical centres, they tend to pressure 'global' suppliers (Humphrey and Memedovic, 2003; Sturgeon and Lester, 2004) to establish local engineering capabilities as well. When this happens, global suppliers can begin to source inputs locally, providing opportunities and support for local Tier 2 suppliers to develop. Over time, it is possible for local firms to start serving automakers directly, and international opportunities can grow from there. Thus, virtuous cycle of development can only develop if the local domestic market is sufficiently large to attract significant investment in the first instance.

A second dynamic has unfolded in a few mid-sized developing countries that are large and rich enough to support the assembly of vehicles without modification. Examples include South Africa, Thailand, and Turkey. These countries have become final assembly hubs for their wider regions. Because there are strong agglomeration economies in the automotive industry, the presence of final assembly plants can provide opportunities for local suppliers producing, especially, bulky, heavy, or fragile parts, such as seats. Proximity to plants assembling existing vehicle designs can create export opportunities as well, even when supply contracts are based on existing blue-prints, because identical vehicles are being produced elsewhere in the world.

A third dynamic has occurred in developing countries that are proximate enough to large markets in developed countries to supply parts on a just-in-time basis and within regional trade blocs, such as Mexico in the North American free trade agreement (NAFTA), Hungary and the Czech Republic in the European Union, and Thailand in the Association of Southeast Asian Nations (ASEAN) and in East Asia more generally. If they are geographically close to large existing markets, they can become hubs, especially for the production of labour-intensive parts. Wire harness and automotive electronics assembly on Mexico's border with the USA is a long standing example, and several

Central and Eastern European countries have taken on a similar role for the industry in Western Europe. As some final assembly has developed in Mexico and Eastern Europe, these plants have been able to serve them, and plants for the production of more capital-intensive parts have been established as well. However, because of the proximity to developed economies, few opportunities have arisen for local suppliers.

A fourth, nascent dynamic is for local lead firms to leverage the new, relatively open local and global supply-base to rapidly become more competitive locally and perhaps, on world markets. Consider the case of Chery automobile, a small state-controlled Chinese company based in Wuhu, some 200 km west of Shanghai that has, within a remarkably short time, been able to develop and market a line of Chery-badged vehicles that, while perhaps not world class, are nevertheless suitable for both the local market and for export to other developing countries. The first Chery prototype was built in December 1999, and volume production began in March 2001. By the end of 2007 capacity had grown to 600,000 units, and Chery was already China's largest vehicle exporter.

To grasp how remarkable this is, we need to understand a few details. Vehicle design and development are a notoriously difficult set of tasks, typically the purview of companies that have been in the business for four to five decades. New vehicle designs commonly require more than 30,000 engineering hours, three to five years to complete, and several billion dollars of up-front investment (Sturgeon et al., 2008). If a firm does enter the business, it usually comes from a field such as aircraft, where related design and engineering experience has been accumulated over a similarly long period (Mitsubishi, Subaru, BMW and SAAB are examples).

Chery has been able to launch its own line of branded vehicles in a very short time frame by tapping the new global supply-base, both within China and in the West, to obtain a full range of inputs, from parts to processes to design expertise. For styling and engineering, Chery works with Italdesign, Pininfarina and Torino in Italy. Additional engineering and development work is outsourced to Lotus Engineering and MIRA in the UK and to Porsche Engineering in Germany and Austria. It works with AVL in Austria on gasoline and diesel engines and with Ricardo in the UK on hybrid powertrains. Heuliez in France supplies a retractable hardtop for the Chery A3 coupe cabriolet, a car designed by Pininfarina. For critical parts and subsystems, Chery sources from global suppliers such as Bosch, ZF, Johnson Controls, Luk, Valeo, TRW and Siemens VDO (Ciferri and Armitage, 2007). These sourcing arrangements, which have only recently become readily available for fledgling companies like Chery to piece together, show that Chery is nothing like a typical car company, and that it is far removed from the most recent entrants to the mass market for cars, the vertically integrated and horizontally diversified national champions from Korea, Hyundai, Kia and Daewoo. Companies that jump to the head of GVCs in this way, however, may still fail to develop deep design and system integration expertise that allow them to compete at the vanguard of fast-moving markets. It is the motivation to gain deep competencies in vehicle design and engineering, more than any other, that has driven local lead firms from China and India to acquire or attempt to acquire distressed auto companies in the West.

What should be clear is that small developing countries far from large existing markets have generally been unable to develop an automotive industry. In most countries with small, easily saturated markets, it has been extremely difficult for local firms to develop a significant role in the industry[6]. Because of this, the geographic shift of the industry from developed countries to emerging markets has been the most dramatic in large developing countries such as China, India, and Brazil.

The above patterns for carmakers have direct extensions to the parts-making sector as they tend to be tightly integrated, see the discussion in Part 1. In 1999, only four firms from developing countries (one each from Malaysia and China and two Indian firms) appeared on a list of lead firms producing at least 100,000 vehicles annually. By 2007, right before the crisis, 12 additional developing country lead firms joined the list, one from Iran and 11 from China. Developing country lead firms' total share of world production increased from 1.9% to 7.5%, but this was almost solely due to increased production by Chinese firms.

The number of firms from developing countries on the global list of the 100 largest part suppliers remained stable, with just one Mexican firm moving up significantly in the ranking. The top 150 list of firms supplying the North American industry went from two to a just single Mexican representative. While Korean lead firms saw their production grow by 25%, almost identical to worldwide production growth, Korean suppliers made huge advances in the supplier rankings. There are now two Korean firms on the top 100 list worldwide and one Korean firm on the top North American list, prior to any Korean assembly plant being opened on the continent. The emergence of strong suppliers lag the development of local production capacity.

Table 2 Top 15 developing, newly developed, and transition economy exporters of intermediate parts for passenger vehicles and motorcycles, ranked by 2008 exports ($M), with 1993 and 2008 world export rank

Exporter	*World rank 1993*	*World rank 2008*	*2008 Exports $M*
China*	21	4	42,463
Mexico	8	6	27,516
Poland	39	8	19,767
Republic of Korea	16	9	18,355
Czech Republic	31	11	17,807
Thailand	20	18	9,551
Brazil	13	19	8,927
Slovakia	40	21	6,107
Romania	46	22	6,060
China (Taiwan)	14	23	5,663
Singapore	19	26	5,085
Indonesia	36	27	3,457
Philippines	27	28	3,438
India	35	29	3,064

Note: *Includes Hong Kong

Source: UN Comtrade, using modified BEC classification (see, Sturgeon and Memedovic, Forthcoming)

In contrast to many other industries, developing countries do not establish a presence in the global automotive industry by making low-level components first and working their way up from there. Instead, final assembly is often the first step and the development of a

parts sector comes later. Sutton (2004) illustrates the difficulty second tier suppliers in China and India have in meeting the quality standards set by foreign carmakers. Brandt and Van Biesebroeck (2008) show that China did not run a trade surplus in parts until 2005. This is the usual pattern: as a local automotive industry develops, the country runs a trade deficit in parts because local producers do not have the capabilities to produce advanced components or the quality standards to sell in advanced markets. Significant parts exports only emerge when final assembly capability is quite mature. This hypothesis is supported by Table 2, which shows the Top 15 developing, newly developed, and transition economy exporters of automotive and motorcycle parts. Most of the countries listed in Table 2 have had substantial final assembly capacity for many decades. This hypothesis is further supported by the falling world ranking of Singapore, which has no final assembly.

5 Case studies of China, India and Mexico

What are the prospects for the growth of the automotive industry in the developing world? It appears that the largest developing countries, especially China and India, are gradually gaining more independence and autonomy as their industries and markets gain in size and importance, and the local design content of vehicles increases to meet the needs of local consumers. On the other hand, countries such as Mexico and countries in East Europe remain as dependent appendages of adjacent regional production systems. Small developing countries are largely out of the game, unless they can play the role of regional producers as do South Africa and Thailand. In this section, we discuss three emblematic cases. The two most successful cases, China and India, have very different patterns of development. The case of Mexico stands in for the peripheral type GVC locations just mentioned. While these few cases cannot provide a comprehensive view of the industry in developing countries, they do provide a flavour of the wide variation in development patterns and prospects for the industry in the developing world.

5.1 China: FDI-led development via cautious and aggressive localisation strategies

Until quite recently, China's automotive industry has depended almost entirely on Western multinationals (lead firms and suppliers) for investment and advanced design and engineering expertise. Chinese firms were only responsible for the very simplest steps in the production process, and parallel (and sometimes redundant) management structures could be observed in joint ventures (JVs) (e.g., Chinese and Western plant manager, engineering manager, etc.). JVs in name only, the Chinese contribution to new investments was often little more than real estate. However, over the course of 20 years, the JVs in assembly and component production have transferred many crucial production, engineering, marketing, and management skills to individuals and independent Chinese firms, a few of which are now operating successfully at each stage of the automotive value chain. Acquisition of technological knowledge, including vehicle design and system integration, has been hastened by the recent economic crisis, which has made some of these assets (e.g., in companies such as SAAB, Volvo, Hummer) available for acquisition at 'fire sale' prices.

In this section, we discuss the development of the Chinese automotive industry with a focus on the impact of the 2008–2009 economic crisis. We do so through a comparison of two distinctive strategies that foreign multinational lead firms have followed in China. Because all of the firms discussed are huge firms with established brands and extensive international operations, their strategies share many elements. However, there are differences in how the rapidly growing Chinese market is being integrated with their global operations[7]. Following from the discussion in the previous section, we can say that some firms have actively tailored their existing vehicle portfolio to the local tastes (the first dynamic mentioned above), while others have focused on selling existing vehicles in upper market segments (the second dynamic played out in the largest developing country market). The former strategy, while riskier because of the larger investment and supply-base support required, has led to greater success because it has allowed multinational corporation (MNC) lead firms to sell more vehicles and compete more directly with local carmakers.

We draw on information collected as part of a global automotive supplier benchmarking study of the international motor vehicle programme (IMVP), which aims to compare and contrast practices, capabilities and performance of automobile suppliers around the world[8]. The identities of the firms we interviewed in China cannot be revealed, but given that the differences fell largely along national lines we will discuss the two strategies in general by contrasting Asian and Western automakers. The first strategy can be referred to as 'cautious localisation'. The Japanese and Korean producers interviewed favour this approach. Vehicles are produced in China in large volumes but entirely designed overseas. Most first-tier suppliers are JVs between a local Chinese firm and a foreign partner that is responsible for manufacture and often the design of the part back in the home country. Some modules are supplied by wholly owned foreign subsidiaries (WOS), which are allowed in China for parts but not for final assembly. The lead firm has to give explicit approval to use domestic firms, which tend to have a large cost advantage, even as second- or third-tier suppliers. As a result, a majority of second-tier suppliers also tend to be either JVs or WOS.

This centralised GVC organisation facilitates product quality but raises costs since parts cannot be altered or easily outsourced to take advantage of lower cost, lower quality manufacturing. In the end, vehicles may cost too much to appeal to a large number of buyers, and it is more difficult to introduce products specifically aimed at the local market. While average income levels in the Chinese economy are rising rapidly, relatively wealthy customers have led the market, leaving the lower priced segments of the market as the fastest growing segments. Japanese and Korean lead firms have sought to avoid competition with the generally low-quality/low-cost domestic firms, but the high costs associated with the cautious localisation strategy have forced them to pursue the upper segment of the market, which is becoming less important over time as vehicle ownership levels in China increase. One potential benefit of this strategy, however, is that it may enable lead firms, over time, to tap into lower-cost sources for parts and components for export to higher cost production locations. Since vehicles produced in China are identical to those being assembled elsewhere, they may be creating a competitive export platform for the future.

Designing vehicles at home for production overseas is the same approach that Japanese automakers have taken to penetrating markets in the USA and Europe described

in Section 2 and to penetrating continental-scale markets in the developing world described in Section 3 (second development dynamic), so the cautious localisation strategy is compatible with the larger global strategies of these firms. The difference is that the market in China, and other developing countries, is vastly different from the market in Japan, while the markets in the USA and Europe have been similar enough to sell vehicles with only minor alterations, such as converting right hand drive vehicles to left hand drive. As a result, with a few exceptions, the vehicles produced by Japanese automakers in Japan, Europe, and the USA, have proved too expensive to sell in large volumes in developing countries.

The second strategy pursued by automotive lead firm MNCs in China we call 'aggressive localisation'. A select number of European and US JVs have taken an approach where both lead firms and first-tier suppliers set up design and engineering centres in China. Parts, modules and eventually complete vehicles are redesigned to better suit the taste and purchasing power of local consumers. An important advantage of this approach is that modules can be redesigned to be compatible with the manufacturing capabilities of the domestic firms and meet local regulatory, i.e., safety and environmental, requirements. In this way, larger fixed costs are incurred in terms of design and engineering, but variable costs fall as lower cost domestic suppliers and production processes can be utilised. As a result, vehicles can be produced in China at lower cost and compete directly with less expensive domestic offerings. The challenge is to find components of the vehicle where this sort of localisation is feasible and cost-effective, while at the same time insuring that quality and fit are not so compromised that the company's brand image is damaged[9].

Only a few automotive lead firm MNCs have chosen the second approach thus far, but this model could prove very disruptive for manufacturing in more developed countries if prices fall and quality improves to the point where large scale parts exports are possible. Moreover, intense competition in the domestic Chinese market and falling prices may be accelerating the process of local capability building. One major international lead firm described a five-year plan to lower its production costs in China by 40% by 2010.

An observable area of difference in the two strategies is in the composition of suppliers. We interviewed several assembly plants, asking for the identity of Tier 1 suppliers for a wide range of major parts and systems (60 to 75 suppliers per firm). In Table 3, we report the fraction of domestic, JV, and WOS Tier 1 suppliers, as well as imports for two domestic, three Asian, two North American, and two European automakers operating in China. Our results show that domestic Chinese lead firms are clearly localising most aggressively and did not report any imports of major modules or systems. These firms were also much more likely to source from 100% domestically-owned firms than from either JVs or foreign subsidiaries: 61% of the suppliers identified were domestic firms, and the rest were JVs.

For the three Asian lead firms, on the other hand, only 5.5% of suppliers were domestic Chinese-owned firms, on average. In two of the three cases, the share was well below 5%. Imports also make up a non-negligible share of components, accounting for almost 22% on average and even one third of parts in one case. In contrast, for the US and European lead firms interviewed, the share of parts sourced from domestic firms was noticeably higher and imports were lower. For one US lead firm, in particular, sourcing is almost as domestically focused as for Chinese lead firms.

Table 3 Sourcing by OEMs in China in 2006 from three possible sources (% of Tier 1 suppliers)

Lead firm	*Domestic firms*	*Joint-ventures*	*Foreign subsidiaries*	*Overseas (imported)*
European	14.0		86.0	0.0
European	23.8		68.3	7.9
US	14.3		57.1	24.5
US	39.6		58.5	3.8
Average Western	*15.4*		*69.7*	*14.5*
Asian	2.2		64.4	33.3
Asian	4.8		85.5	9.7
Asian	9.4		67.9	22.6
Average Asian	*5.5*		*72.6*	*21.9*
Chinese	58.2		41.8	0.0
Chinese	63.4		36.6	0.0
Average Chinese	*60.8*		*39.2*	*0.0*
Average (all)	*25.5*		*62.9*	*11.3*

Source: Based on plant interviews conducted in 2006 and described in Brandt and Van Biesebroeck (2008)

While the two approaches to expansion in China have been apparent for some time, the effect of the crisis has, by and large, meant an acceleration of the observed pre-crisis differences, at least in the short term. For some firms, the aggressive localisation strategy has been driven by scarcity of resources – either financial or in terms of management capacity. The greater toll of the crisis on US lead firms, in particular, has further encouraged a very aggressive expansion strategy in China, since sales there accounted for as many vehicle sales as the US market in the first nine months of 2009. Starved of funds for vehicle development, reliance on global suppliers to tailor vehicles to local tastes has also been deepened in this high growth market. The need for cost savings has intensified the quest to utilise lower costs Tier 2 and 3 suppliers in China as well.

On the other hand, the crisis has made firms pursing the cautious localisation strategy, in particular the Japanese, even more cautious. A common strategy for firms in a recession is to return to core markets and perceived comparative advantages. During a recession, there is even less incentive to deviate from strategies – centred on efficient production and high quality – that have served Japanese lead firms relatively well in the past.

More generally, the aggressive localisation strategy of Chinese engagement can be viewed as a more short term, less patient strategy. The objective is to expand Chinese sales quickly without waiting for the Chinese middle class to grow even richer or technological capabilities in the local supply to rise even further, such that the same vehicles popular in the West or in Japan can be sold broadly. It is also a higher risk strategy as there is a non-negligible risk that the premium brand advantage will be eroded if low quality local parts find their way too quickly into their Chinese-made vehicles. Again, such a strategy appeals most to firms hit hardest by the crisis. Clearly, the aggressive localisation strategy provides more robust, if less stable, opportunities for local suppliers to participate in automotive GVCs, acquire new competencies, and thus

provide a resource for local lead firms seeking to improve their product line up and contemplate exports. A similar pattern has long been observed in comparative research of GVC development in industries such as electronics and motorbikes (Borrus et al., 2000; Kawakami and Sturgeon, forthcoming). In broad strokes, Japanese MNC affiliates provide excellent learning opportunities for the few local suppliers selected. These suppliers are supported, especially, in their efforts to meet quality requirements. On the other hand, because the Japanese lead firms prefer long-term, captive GVC relationships, subsequent opportunities were few, and local suppliers tend to be walled off from higher value segments of the value chain. Working for US companies can provide broader learning opportunities, but US managers' willingness to switch suppliers means that mistakes can followed by a sudden loss of business. If suppliers fail to provide adequate services, US buyers are more likely to move on without helping suppliers to find remedies.

5.2 India: home-grown automakers lead the way

In contrast to China, India has relied more on home-grown lead firms to propel its industry. A disadvantage of this approach is that the absorption of global best practices has been proceeding more slowly (Sutton, 2004). Nevertheless, the development of the Indian automotive industry has accelerated very quickly in the past several years. This improvement in the breadth and depth of local capabilities has been aided, most notably, by foreign acquisitions.

Because income growth, on a per capita basis, is growing more slowly in India than in China, market potential was not perceived to be sufficiently large to convince foreign lead firms to take the investment risks they did in China. As a result, while growth in the Indian industry has started earlier than it did in China, it has proceeded at a slower pace. Nevertheless, every aspect of vehicle development and production, including design and engineering, has been present in local firms from the beginning, and this has allowed the industry in India to surge forward.

To gauge the difference in initial development between China and India, it is instructive to compare the leading car producing companies in both countries in 2001 and 2009. In India, none of the leading global lead firms were active in 2001. Suzuki, the number one producer in India, ranked 15th in the world when it began production, accounting for about 10% of GMs sales (GM is Suzuki's majority owner). Furthermore, its Indian JV has operated with a great deal of independence and input from the local partner, Maruti. Hyundai, India's number two producer, was only the 8th largest producer worldwide at the time it began production in the country. The next two firms, Tata and Hindustan Motors, are independently owned Indian firms. In China, by contrast, all of the six largest producers were foreign JVs and Ford was the only of the top seven firms worldwide not producing in the country[10].

The situation had converged only slightly by 2009 with the distinction between the Indian and Chinese market structures still notable. In India, Mahindra replaced Hindustan Motors in fourth position. Several more foreign firms are now operating plants, but even the largest only produced 66,000 units (General Motors). The total market share held by domestic firms still exceeds two thirds. In China, the extremely rapid growth in total production, from barely 600,000 in 2001 to almost 14 million in 2009 (the latter includes commercial vehicles), has created opportunities for new, domestic entrants. Still, JVs by Volkswagen and General Motors continue to dominate the industry, and almost all

large international groups have sizeable operations. Chana Automobile and Beijing Automotive are state-owned firms with some market success, but they are highly dependent on a few models. The independent plants of the three largest domestic automotive groups, two owned by the central government (FAW and Dongfeng) and one owned by the city of Shanghai [Shanghai Automotive Industrial Corporation (SAIC)], now account for almost 12% of the market, but these firms derive most of their sales and profits from JVs with their Western partners. Chery, Geely, and BYD are three prominent private firms that operate independently and design a portfolio of vehicles themselves. At this point they operate at a small scale, but all have ambitious growth plans.

Table 4 Leading car producers in India and China in 2001 and 2009

Indian producers	*Market share*		*Chinese producers*	*Market share*	
	2001	*2009*		*2001*	*2009*
Maruti Udyog (JV with Suzuki)	62.2%	36.7%	Volkswagen JVs (SAIC and FAW)	51.6%	9.0%
Hyundai Motor India	16.5%	21.3%	Citroen JV (Dongfeng)	10.2%	
Tata	11.5%	19.2%	GM JV (SAIC)	8.2%	12.6%
Hindustan Motors	3.4%		Honda JV (Guangzhou)	7.2%	
Mahindra		8.5%	Daihatsu JV (Tianjin Xiali)	7.2%	
			Chana automobile		10.4%
			Hyundai JV		5.9%
			Beijing automotive		5.0%
			(Independent plants of FAW-SAIC-Dongfeng)		(11.8%)
Top 4:	93.6%	85.6%	Top 5 (Top 8):	84.4%	42.8% (59.1%)
Vehicles produced	529,947	2,632,694	Vehicles produced	597,074	13,790,994

Source: Source: 2001 statistics from Sutton (2004) and 2009 statistics from the International Organization of Motor Vehicle Manufacturers

We now compare the local sourcing strategies and the development of lead firms in India and China. As was already shown in Table 3, sourcing by Chinese lead firms is almost fully local. Chinese lead firms are piggybacking on the global supply chain that has emerged around the joint-venture car assemblers, on one hand, and are providing some local first-tier suppliers with important 'learning' opportunities on the other. Currently, as we saw in the Chery case in Section 3, local lead firms contract out much of their design work (and even some of the engineering and testing) to vehicle engineering companies. The 'integral' design architecture of motor vehicles highlights the fact that these firms will have to master design and development capabilities to be independently successful.

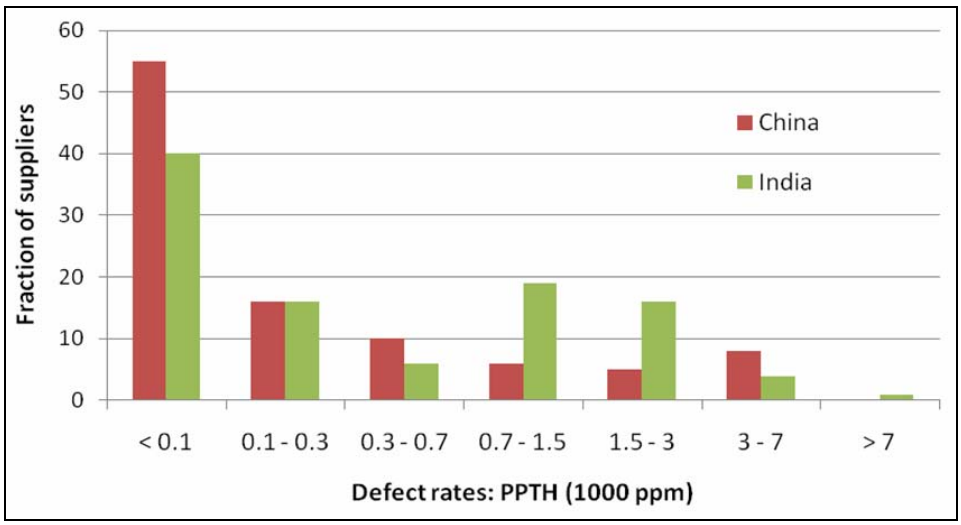
Firms such as Chery and Geely are providing domestic suppliers, as well as JV suppliers, important opportunities to upgrade their capabilities and to become more deeply involved in the design, prototype development, testing and mass production of important parts and vehicle sub-systems. Managers at a several major JV suppliers interviewed as part of our field research expressed similar sentiments about the emerging 'learning' opportunities provided by local lead firms, and described how they hoped to build on them. The process of capability building can be difficult and time consuming,

and weaknesses in areas such as system integration on the part of domestic lead firms presents a set of issues for suppliers that are distinct from those faced when they serve customers with deeper competencies. However, the first-tier suppliers we interviewed were nearly universal in how impressed they were with the speed of learning at firms like Chery. The rapid proliferation of models sold by these firms is testimony to the opportunities being provided.

In addition, competition with the most advanced domestic firms – Chery, Geely and SAIC – is proving to be a major stimulus for some foreign lead firms to pursue an aggressive localisation strategy. Only by sourcing locally almost as much as Chinese lead firms, foreign automakers have been able to compete for the middle of the market – a segment which is growing especially strongly.

Statistics in Figure 1 illustrate the higher defect rates (in parts-per-thousands) for Indian versus Chinese suppliers. Because the foreign automakers invested more aggressively to build up a local supply chain in China than in India, it is not surprising that Indian suppliers were lagging Chinese suppliers in both productivity and quality. This was already the case in 2003 at the time of the initial field research, reported in Sutton (2004). A follow-up study by Brandt and Van Biesebroeck (2008) three years later shows remarkable improvement by the Chinese firms that is unlikely to be matched in the Indian industry, which has been growing more slowly.

Figure 1 Supplier defect rates for new generation lead firms (see online version for colours)



Source: Brandt and Van Biesebroeck (2008)

Because Indian industrial policy promoted local lead firms from the start, domestic capabilities in design, vehicle development, and engineering have emerged. When local expertise was missing, the independent lead firms, such as Tata Motors, acquired Western companies or formed international JVs.

While Indian lead firms have remained focused on the domestic market, Chinese lead firms have begun to export, or at least consider exporting, finished vehicles. Geely has repeatedly postponed its plans to start exporting vehicles to North America, but it is likely to happen eventually. During its restructuring, DaimlerChrysler briefly contracted

Chery to manufacture and export compact cars to North America. SAIC – the joint-venture partner of General Motors and Volkswagen in Shanghai – has announced its intentions to start exporting and competing with its joint-venture partners in their home markets. A new JV involving Honda in Guangzhou is already exporting small compact cars (the Fit/Jazz model) to Europe.

The recent economic crisis caused Western lead firms and global suppliers to shed assets that would not have been otherwise available for acquisition. Tata Motors was the first lead firm from a developing country to purchase divisions of Western lead firms that were struggling for survival. In July of 2007, Tata acquired the venerable British luxury vehicle brands Jaguar and Land Rover from Ford. The deal included the brand names, production facilities in the UK, design and engineering facilities, and compensation to Ford for the intellectual property tied up in existing models. This acquisition of know-how, especially on the design and development side, is by far the largest prize. These capabilities could provide the company with skills and technological knowledge necessary to satisfy consumers in the West and meet the emissions and safety standards of mature markets.

Tata's acquisition of Jaguar and Land Rover has been followed by a flurry of deals or near-deals involving Chinese companies. Most of these have been motivated by a desire to acquire foreign technology. The following have been noteworthy:

- *SAIC* entered into a JV partnership to produce former Rover models in China in June 2004. After losing a legal battle over the brand name it launched its own model on the Rover platform.
- *SAIC* invested $500 million to acquire a controlling stake in Ssangyong, a South Korean automaker in October 2004. This followed a 2002 investment to buy a 10% stake in Daewoo, another South Korean automaker controlled by GM.
- *Nanjing automobile* acquired the British MG Rover and shipped production equipment to China in July 2005. The company restarted production of MGs in China in 2007.
- *SAIC* purchased Nanjing Automobile in December 2007 and restarted production of MGs in the UK in 2008.
- *SAIC* began talks with bankrupt German automotive design house and contract assembler Karmann in February 2008 for a future development and contract manufacturing project. Karmann was acquired by Volkswagen in November 2009.
- *Tenzhong heavy industrial machinery*, a privately-owned Chinese road equipment manufacturer signed a memorandum of understanding with GM to purchase the Hummer unit in June 2009.
- After a rejection of *Beijing automotive's (BAIC)* bid for Opel, it signed a partnership deal with the Swedish Koenigsegg Group that was negotiating to purchase Saab from GM September 2009. At the time of this writing, GM has not been able to find a suitable buyer for SAAB and has stated its plans to liquidate the division.
- *Geely* is the sole remaining negotiator to purchase Volvo from Ford. A tentative agreement to complete the sale in the first quarter of 2010 was announced by Ford in December 2009.

Several other announcement illustrate that developing country lead firms are claiming an increasingly important role in the global automotive industry. Again, Tata Motors is leading the way:

- *Tata* launched the Nano, a highly anticipated 'one lakh' (100,000 rupies, approximately €1,800) car in January 2008. A version for Europe is anticipated for 2012.
- Berkshire Hathaway (the investment firm of Warren Buffett) invested $230 million to acquire a 10% stake in *BYD*, a Chinese battery maker from Shenzhen with aspirations to manufacture electric vehicles, September 2008.
- *SAIC* took majority control (50% + 1%) of Shanghai GM in December 2009, and teamed up with GM to enter the Indian market via a new JV. SAIC has also announced plans to produce 200,000 vehicles under its own brand(s) by 2010, 50,000 of which are intended for exports. Much of this production will take place in a wholly-owned plant (i.e., without its JV partners GM or VW) in Yizhen, Jiangsu province.
- Volkswagen announced a €2.5 billion investment to acquire a 20% stake in *Suzuki* in December 2009. Suzuki's dominant position in the Indian market through its JV with Maruti was cited as the prime motivation.

The export-led and GVC-engaged strategies of firms in the Chinese auto industry provide a boost to quick technological learning, relative to the more autarkic industry in India. At the same time, Indian automakers have developed a deeper and broader set of competencies that could stand them in good stead in the long run. As markets shift to developing countries, increasing the potential for sales of simpler, lower cost vehicles, it is unclear which of these approaches will win out in the long run, or if they will eventually converge to make the distinction less than clear.

5.3 Mexico: dependent development in a peripheral producer

In contrast to China and India, where domestic lead firms play an important role, the Mexican industry is highly integrated in the North American production system. It relies almost entirely on foreign lead firms and suppliers to provide it with vehicle designs and investment. The country's annual car sales are too small, due to its population size and level of economic development, to warrant many models made specifically for the local market. Relatively low wage costs make Mexico an attractive export platform for the NAFTA market. In the four years from 2004 to 2007, Mexican production expanded by 35.5%, while US production fell 9.5% and Canadian production also declined by 4.5%. Almost all of this expansion was due to exports to the USA. Table 5 shows very high export ratios – specifically to other NAFTA countries – for all producers in Mexico (though less so for Volkswagen and Nissan, which use their plants in Mexico to serve the local market and for export to other countries in Latin America).

Table 5 Production, sales, and exports by automakers with assembly plants in Mexico, 2004–2007

	Domestic production	*Domestic production sold locally*	*Imports*	*Exports*	*Exports to USA and Canada*	*Total domestic sales*
GM	1,884,730	385,665	585,989	1,499,065	1,483,965	971,654
Nissan	1,550,563	726,829	184,209	823,734	669,167	911,038
Chrysler	1,282,670	20,785	475,948	1,261,885	1,185,608	496,733
Volkswagen	1,282,314	261,979	329,356	1,020,335	568,750	591,335
Ford	909,480	165,007	527,052	744,473	730,110	692,059
Honda	89,753	29,734	133,309	60,019	52,713	163,043
Toyota	65,458	0	185,490	65,458	42,360	185,490
Total	7,064,968	1,589,999	2,421,353	5,474,969	4,732,673	4,011,352
	% of domestic sales produced locally	*Share of local production exported*	*Share of exports to the USA and Canada*	*Exports CAGR 04–07*	*Production CAGR 04–07*	*Domestic sales CAGR 04–07*
GM	40%	80%	99%	1%	–1%	–3%
Nissan	80%	53%	81%	34%	16%	–2%
Chrysler	4%	98%	94%	–7%	–6%	4%
Volkswagen	44%	80%	56%	27%	22%	–7%
Ford	24%	82%	98%	54%	41%	–5%
Honda	18%	67%	88%	3%	–3%	18%
Toyota*	0%*	100%*	100%*	NA*	NA*	40%
Total	40%	77%	86%	14%	10%	–1%

Notes: *Toyota began production in Mexico in 2006; production data are for 2006 and 2007 only. Figures for domestic sales are for 2004–2007.

Source: Associacion Mexicana de la Industria Automotriz (AMIA)

Mexico has also become an important export platform for automotive parts within North America. In 1990, Mexico ranked third as an exporter of automotive parts to the USA ($5.2 B), well behind Japan ($10.2 B) and Canada ($8.4 B). By 2005, Mexico occupied to top position, with exports to the USA reaching $18.5 B. For some labour-intensive parts, wiring harnesses perhaps being the best example, Mexican producers have a NAFTA market share of more than 90%. Note that most of these suppliers are global suppliers operating gigantic facilities in Mexico both for export and shipment to domestic assembly plants.

Production of auto parts, especially electronics and other labour-intensive parts, began in the border region of Mexico well before NAFTA, with investments and sourcing driven by US firms seeking to cut costs. But after NAFTA, investments surged to the interior. Except for investments to support Nissan's presence in Aguascalientes, the only high volume Japanese-owned assembly plant in Mexico, Japanese parts suppliers have announced only a few sizable investments in Mexico, such as Ahresty's $66 M foundry in Zacatecas and Bridgestone's $81 M lampblack plant in Tamaulipas.

Integration with the larger North American region boosted Mexican production disproportionately in the good years, but it also exposed the country to the US-originated crises and the deep problems of the US-based lead firms that have been responsible for the bulk of final assembly investments and parts exports. The greater importance of smaller vehicles in its assembly plants, and the propensity of US-owned plants to concentrate closures in higher cost plants in the USA and Canada have softened the blow to some extent. While North American production declined by 16.4% between 2007 and 2008, Mexican production increased slightly, by 3.9%. As a result production of finished vehicles in Mexico surpassed Canadian production for the first time in 2008.

Clearly, the fate of an industry in a small, regionally embedded country like Mexico is tied to factors that lie largely outside the control of the state or of local firms. Ironically, the flagging prospects of the Big 3 automakers have created more risks for Mexico and Canada than it has for the USA[11]. These companies, even though they are based in the USA, have been more important in driving investment and industrial upgrading in Mexico than Asian firms have. Japanese and Korean automakers, with the exception of Nissan, have concentrated their North American investments within the USA (and to a lesser extent, Canada) for political reasons, while the Big 3, when they have made new North American investments at all, have sought to cut costs in North America by building and planning new capacity in Mexico. Now, with the crisis, we believe that the future of this most recent investment wave must be called into question by the severe crisis that has currently overtaken the Big 3.

6 Conclusions

While we have presented much of the discussion in fairly general terms, one should not forget the tremendous heterogeneity in the experiences of firms or industrial groups. Lead firms have different histories and resources, and extremely diverse experiences as the economic crisis has unfolded. The heterogeneous experiences range from an all-out collapse and radical restructuring at General Motors and Chrysler, a retrenching on core strategy until demand picks up for Toyota and Volkswagen, and pursuing opportunistic growth opportunities either conservatively (Hyundai) or aggressively (SAIC, Geely, and Tata).

First, we sum up what we think can be learned from the recent crisis in the automotive sector. In particular, we ask if government interventions in North America and Europe positioned the industries in these regions to compete effectively in the future. Although the process of restructuring is still underway, we can make several observations, as follows.

- Economic nationalism cannot be ignored in this industry. To a remarkable extent, governments have been willing to put money on the line to support national champions, even at the risk of angering their trading partners and political allies. The strength of the German government's interest in supporting GM's European Division, Opel, may be due not only its position as a major employer, but also to its roots as a German company prior to its acquisition by GM in 1929. Deep historical roots such as these drive political sensitivities, help to justify government bailouts, and serve to strengthening the regional pattern of GVC organisation of the industry.

These same dynamics are likely to play a role if finished vehicle exports from developing countries, such as China or India, increase substantially, or even if parts imports to Western economies increase suddenly after the crisis. For example, if history is any guide, companies such as Tata (India) and Geely (China) will have to establish or purchase substantial final assembly capacity in the (economic) heart of North America and Western Europe, if they intend to sell large quantities of vehicles in these regions, just as Japanese and Korean firms have done in North America and GM and Volkswagen have done in China. At the same time, if market share losses continue, firms based in the USA and Western Europe are likely to continue to shift production to the low cost peripheries of East and Central Europe and Mexico to reduce operating costs. The tendency for vehicles to be built where they are sold, and manufactured in the context of regional production systems will not quickly fade away. Indeed, the political dynamics that underlie these GVC patterns have been dramatically exposed by the nationalistic government responses to the 2008–2009 economic crisis.

- From a GVC perspective, the incessant political attention paid to automakers, the lead firms in the supply chain, have further weakened the relative position of suppliers. Even though Delphi employed approximately the same number of workers as its former parent, GM, and filed for Chapter 11 in 2005, politicians only paid attention when GM itself inched towards bankruptcy in 2008. The decision by the Obama Administration to run the supplier support programme through lead firms can only tie suppliers more tightly to old commercial relationships with firms that are losing market share.

- Chinese interests in purchasing struggling carmakers are just one illustration of the rising importance of developing countries in this industry (Thun, 2006). An important motivation for these firms' acquisition efforts is to acquire advanced engineering and design expertise, which they have thus far largely outsourced to European-based automotive design firms (Whittaker et al., 2010).

Efforts by lead firms from China and India to acquire assets and skills in the higher value added portions of the supply chain, in normal times, would have been vehemently opposed, but in the crisis climate the desire to save jobs trumped those concerns. In the short run, the nationalistic stance of Western governments may have made it harder for lead firms from developing countries to penetrate mature markets, but this is not the end of the story. In the crisis, firms with a comparative advantage in smaller vehicles, Hyundai and Suzuki, have been hurt the least, and have gained market share. At the very least, the crisis has provided good marketing opportunities for firms producing lower quality and lower price vehicles, such as the Dacia Logan from Romania or the Tata Nano from India, vehicles that have garnered much attention in the news media.

In addition to firm heterogeneity, differences across countries limit the available options for the automotive industry in the developing world. The extremely large development cost for country- or region-specific vehicles and the tendency for co-location of suppliers and lead firms puts an independently viable industry beyond the reach of all except the very largest developing countries. As discussed in Section 3, the

options are limited to becoming a local assembly hub or specialising in labour intensive tasks for a nearby, more mature auto industry. Both options provide growth possibilities for local suppliers and opportunities to move up in the value chain. However, both strategies take a very long time since the selection of new suppliers is tied to new vehicle programmes, which have a four- to six-year lifecycle.

In the longer run, the close collaboration and co-location of lead firms and suppliers that have always characterised the industry are finally working to the advantage of developing countries[12]. Global suppliers have been concentrating an increasing share of product development in the industry's traditional design centres. Virtually all development took place in the USA, Germany, and Japan, where most lead firms and suppliers co-located. Now that some developing country markets have grown sufficiently to warrant market-specific vehicles, lead firms and suppliers are setting up local design centres. Once these reach sufficient scale, more suppliers will follow. Well established industry clusters, based on industry-specific labour markets and skills, tend to be very long lived. The prospects, therefore, are bright for the automotive industries in China and India. While it is too soon to write off strong competitors from advanced economies, either automakers or large suppliers, the role of local firms in their own domestic industries, and in exports, is likely to grow over time.

If the experience of the Korean industry is any guide, it is likely that the increasing production capacity in developing countries will be followed – with a lag – by the emergence of important supplier firms. This process is far from automatic though. Our evidence from China and India underscores the importance of satisfying and exceeding quality standards set by foreign lead firms and tier one suppliers. The minimum scale requirements in this industry make it nearly impossible in today's environment to succeed with a strategy that purely promotes national champions.

The experience of the Mexican industry, like that in Turkey or Thailand, highlights further that success by independent suppliers is extremely difficult, but not even necessary to achieve strong local employment. Several countries that have tried to develop an independent industry, and have devoted enormous resources to this, have lately changed course and opened up more to foreign investment. The auto industry in Russia, Iran, and Malaysia stand a chance in the global industry only if foreign lead firms are welcomed, rather than discouraged.

The experience of successful suppliers in developing countries suggests that three objectives have to be achieved in turn. The first goal is to achieve worldwide quality standards. This is a necessary condition to start supplying internationally competitive supply chains. The second goal is to improve productivity. Achieving quality standards will already require a great deal of automation. In order to be a viable supplier, productivity levels have to be sufficiently high and improve at the same speed as the average technological progress in the sector to match continuous price declines that are the norm. Third, firms should acquire design capabilities – a necessary step to greater independence and also a pre-condition to become lead supplier on a part when new vehicle programmes are started. To achieve the first two goals, working in the value chains of foreign-owned firms accelerates the process. To achieve the third goal, it is often extremely valuable to also work for domestic lead firms as they tend to give local suppliers greater opportunities.

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Notes

1 This section is based on Sturgeon et al. (2008).

2 Of the three major vehicle-producing regions, regional integration is the most pronounced in North America. In 2004, 75.1% of automotive industry trade was intra-regional there, in contrast to 71.2% in Western Europe, and 23% in Asia [Dicken, (2007), p.305].

3 Volkswagen is exceptional in that it has concentrated all of its North American production in Mexico, and Nissan is the sole Japanese automaker that has built up large-scale, export-oriented final assembly there.

4 The large US trade deficit with China might have influenced Honda's decision to export the Honda Jazz to the European Union from China, while the almost identical Honda Fit for North America is shipped from Japan.

5 For a more detailed discussion of these issues, we refer the interested reader to Sturgeon and Van Biesebroeck (2009).

6 An exception is Taiwan, which has developed a significant export industry supplying standardised parts for use in aftermarket repair (Cunningham et al., 2005).

7 These differences are not limited to China. Also in Europe or in Latin America some firms have always followed a lot more engaged strategy. The chosen strategy in China for a given firm seems to carry over well to its operations in different parts of the world.

8 The international assessment, focusing on seats, exhaust systems and brakes, will cover plants in China, South Korea, Japan, Europe and North America. We have already collected data in plants in China, Japan, and in a few European plants. Further information of this project can be found in Brandt and Van Biesebroeck (2008).

9 Some automotive lead firms are pursuing global strategies that lie somewhere between cautious and aggressive localisation by trying to increase the share of parts common among global vehicle families but maintaining high degrees of product differentiation across global markets.

10 Volkswagen two JVs with FAW and SAIC are very independent operations. Citroen is part of PSA, the Number 6 firm globally, and Daihatsu is part of Toyota, Number 3 globally at the time. DaimlerChrysler (#5) is not in this shortlist, but was in fact the first firm entering the Chinese market with a production JV in Beijing.

11 In 2005, the automotive assembly and parts sectors accounted for 1.05% of Canada's total private sector employment and 1.07% of Mexico's, but only .77% of the USA' (based on calculation using ILO, US Bureau of Labour Statistics; INEGI, and AMDA data).

12 For China, the tremendous success of the SAIC JVs with GM and VW have made Shanghai a world class hub of the global auto industry. Two of the most successful private firms, Chery and Geely, are located in adjacent provinces. GM built a $250 million technical centre there, employing 2,500 employees. Other production centres exist – fully 27 of 30 provinces have their own assembly plant – but the supply base in and around Shanghai, especially, is unrivalled in China (Thun, 2006). The activity in India is less concentrated, which makes it less advantageous for suppliers to establish large local operations. Tata Motors and Mahindra and Mahindra have their headquarters in Mumbai, Maruti-Suzuki near Delhi; GM India is located near Vadodara in Gujarat; and Hyundai Motor India in Chennai, and Kirloskar, the JV partner of Toyota, is headquartered in Pune, Maharastra.

The offshore services value chain: upgrading trajectories in developing countries

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Abstract: This article analyses the offshore services industry using the global value chain approach. This industry has grown at a rapid pace over the last decade, driven principally by the search of businesses to reduce costs by unbundling and offshoring corporate services. This paper explores how developing nations have seized these growth opportunities. While developed countries consume the vast majority of global services, demand from developing economies and new end markets is beginning to grow. Supply is dominated by India, which in 2009 had 45% of the global market share for offshore services. Indian firms occupy most value chain segments and they have expanded in the South to serve both domestic and export markets. Although the quality and quantity of human capital remains the key factor in the location of offshore services, formal education is being supplemented by demand-driven training and compliance with required international professional certifications and performance standards.

Keywords: global services; outsourcing; knowledge economy; information technology; IT; business process outsourcing; BPO; knowledge process outsourcing; KPO.

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1 Introduction

Structural changes in the world economy during the past decade have facilitated the global outsourcing of the internal business activities of multinational corporations (MNCs), thereby creating the offshore services industry, a new and rapidly growing sector in developing countries [Gereffi and Fernandez-Stark, (2010b), p.1]. Information technology (IT) now allows for quick and easy information transfer. Companies looking to improve their efficiency levels in the global economy, reduce costs and increase flexibility (Lopez et al., 2008) unbundled their corporate functions, such as human resource management, customer support, accounting and finance, and procurement operations, and 'offshored' these activities (Gospel and Sako, 2008; Sako, 2006). This reduced the burden of support activities and allowed firms to focus on their core business.

MNCs began by offshoring basic service activities to India in the early 1990s, but now, at the end of the first decade of the 21st century, increasingly sophisticated services are performed for these firms by operations centres in a growing number of developing countries. These firms were attracted to establishing offshore services in developing countries by key competitive advantages, particularly low human resource costs, technological skills, and language proficiency (AT Kearney, 2007). Time zones and geographical and cultural proximity to major markets also played key roles in location selection [ECLAC, (2008), Chapter 2]. In recent years, core activities have begun to move offshore as well, and many firms now look for new talent in developing countries in order to drive product development, research and development (R&D) and other knowledge-intensive activities. As more of these sophisticated jobs are performed abroad, the supply of scientific, engineering, and analytical talent offered by developing countries is becoming significant (Couto et al., 2007). The increasing participation of developing countries in this new industry highlights the growing capabilities of the South, not only at the production level but also in creating the knowledge behind the products. The offshore services sector in 2010 accounted for US$252 billion in revenues[1] and employed over 4 million people globally, most of whom are in developing countries.[2]

India is the market leader and dominates most of the value chain segments. However, other developing countries are providing a variety of offshore services. As they upgrade to higher-value activities, low-income countries are joining the industry at lower points of the chain. This dynamic opens up a chance for new nations to enter the value chain, thus offering an opportunity to drive sustainable growth through the expansion of the knowledge economy. In addition to providing employment in good jobs and creating international linkages with the global markets, this industry has begun to foster domestic innovation and industrial development. In particular, large developing country providers are now seeing a fast growing demand for their services in markets of the South as local firms recognise the benefits of outsourcing to drive their growth. This expansion of demand to new regions, combined with the industry's raison d'etre to lower costs, highlights the resiliency of the industry in the face of economic crises. Indeed, the 2008–2009 economic crisis did little to slow the industry or reverse its growth trajectory (Borchert and Mattoo, 2009; Gereffi and Fernandez-Stark, 2010b).

The evolution of the market and the structural changes that have helped to drive it suggest this shift of offshore service work to the developing world will be permanent. Despite significant political opposition to the advancement of the industry in developed countries, well documented by Mankiw and Swagel (2006), the industry gained momentum at the outset of the 21st century, with compound annual growth rates of 24.2% between 2005 and 2007 prior to the economic crisis of 2008 (OECD, 2008). As more firms in the developing world adopt outsourcing and offshoring of services and add to this global growth, these structural changes will be consolidated. Faced with less competition from large global providers, this expansion of domestic demand provides smaller firms in developing countries with further opportunities to enter, and possibly upgrade through, the value chain.

In order to capture the gains of this evolving market, many developing countries have been pursuing workforce development strategies to encourage upgrading. Analysis of the rapid development of India's industry, in spite of a poor business environment and weak education system (Athreye and Hobday, 2010), revealed the importance of investing in human capital to drive growth (Wadhwa et al., 2008). Highly focused private sector

investments in skill development have been particularly important in the shift of India and other developing countries into higher value service provision.

This paper uses the global value chain (GVC) framework to analyse major changes in the global supply of services and to identify diverse upgrading trajectories among developing countries. By mapping the various types of offshore service activities and the firms that participate in different industry segments, the GVC approach encompasses both micro- and macro-level examinations of the dynamic processes at work in globalization (Gereffi, 1994, 1999; Gereffi and Kaplinsky, 2001; Humphrey and Schmitz, 2002; Kaplinsky, 2000). A particular concern in this paper is how the diversification of end markets for global services offers new opportunities for upgrading by developing economies.

The organisation of the paper is as follows. The first section provides an overview of the offshore services value chain, emphasising the structure and dynamics of a service-sector chain based on human capital. Second, the market size and the role of lead firms in the industry are examined in the context of the changing patterns of global supply and demand of offshore services both in the developed and developing world. The third section discusses the potential contributions of the industry in engaging developing countries in the rapidly advancing knowledge economy. The fourth and final section applies the GVC upgrading perspective to industry growth, with a specific focus on how workforce development initiatives contribute to the movement of developing countries into higher value segments of the value chain.

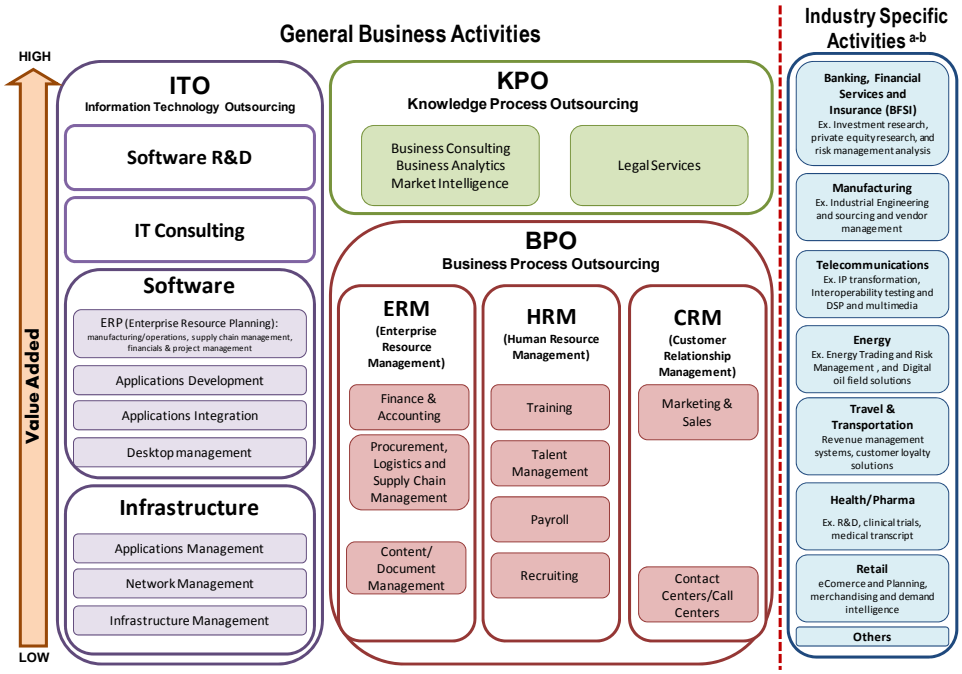
2 Offshore services: a GVC approach

The offshore services industry has evolved continuously since its inception, making efforts at categorisation challenging. Despite these complexities, a fairly comprehensive, yet flexible, classification of the industry has emerged employing the GVC framework (Gereffi and Fernandez-Stark, 2010a), which uses firm-level analysis to determine the different stages of production of a good or service and the value of each component (Gereffi and Kaplinsky, 2001). For manufacturing and extractive industries based on goods, value-added is determined by the difference between the cost of the inputs and outputs at each stage of the chain. In the case of the offshore services industry, measuring value is complicated by the lack of reliable company-level data and trade statistics for services (Sturgeon and Gereffi, 2009). The rapid evolution of the industry has impeded previous attempts to categorize it, complicating the measurement of the offshore services themselves [ECLAC, (2008), Chapter II; UNCTAD, (2009), Chapter III].

To partially address this problem, the value of different services in the offshore services value chain can be related to skill levels and work experience, that is to say, the human capital inputs of offshore services. Human capital is a key determinant of value creation and success in service exports from developing countries. Saez and Goswami (2010) find positive and significant correlation between human capital and service exports after controlling for institutional variables and electronic infrastructure. In addition, research by Nyahoho (2010) on the importance of factor intensity as a determinant of trade also finds that human capital is clearly related to exports of information services, while Shingal (2010) finds that human capital is one of three key variables that have the biggest impact on bilateral service trade.

We have developed a classification of the offshore services value chain, which is presented in Figure 1.[3] The first categorisation refers to three broad types of offshore services that can be provided across all industries (general business services): information technology outsourcing (ITO), business process outsourcing (BPO), and knowledge process outsourcing (KPO). The second categorisation refers to services that are industry specific. Firms providing general business services tend to be process-oriented, while those in the vertical chains must have industry-specific expertise and their services may have limited applicability in other industries. For general business services, all activities are related to supporting generic business functions, such as network management, application integration, payroll, call centres, accounting, and human resources. In addition, they include higher-value services, such as market intelligence, business analytics, and legal services (referred to as KPO in this paper). Within these services, ITO contains a full spectrum of low- middle- and high-value activities of the offshore services chain; BPO activities are in the low and middle segments, while KPO activities are in the highest-value segment of the chain.[4]

Figure 1 The offshore services industry GVC (see online version for colours)



Notes: [a]Industry specific: Each industry has its own value chain. Within each of these chains, there are associated services that can be offshored. This diagram captures the industries with the highest demand for offshore services.
[b]This graphical depiction of industry specific services does not imply value levels. Each industry may include ITO, BPO and advanced activities.

Source: Gereffi and Fernandez-Stark (2010a)

The value of different services in the chain is related to the level of preparation of the workforce required to provide the services at each stage (Gereffi and Fernandez-Stark, 2010a). In addition to encompassing technical abilities acquired through an employee's formal education and experience, preparation includes other important aspects such as

language capabilities, interpersonal or soft skills such as leadership, teamwork and innovation, and global certifications earned through specialised training. This means that employees in activities located in the lower part of the value chain diagram have less preparation, particularly with respect to specialised skills, while the employees in the upper section of the value chain have greater skills and more years of experience and therefore command higher wages (see Table 1).

The ITO segment illustrates these differences: low value IT services include network and infrastructure management provided by computer technicians (1–2 years of post-secondary education); software development such as creating database applications is undertaken by computer engineering graduates (3–4 years, Bachelor's degree, specialised certifications in software platforms such as Cisco, Microsoft and Oracle); while software R&D to be applied in new technologies requires employees with either higher levels of education, years of experience such as post-graduate (Masters and PhD) degrees or with significant specialised training. Positions in R&D also typically rely on highly innovative individuals.

Table 1 Employment, revenue and salary information, selected segments of the offshore services industry in a middle-income country, 2008

Segment	*Activities*	*Most populous position within segment*	*Average education level for employees*	*Average revenue per employee*[a] *(US$)*	*Median salary per employee*[a]
BPO	Call centres	Call centre agents and technicians	High school/bachelors degree	$19,720	$17,280
ITO	IT infrastructure	Computer technician	High school/technical institute	$20,704	$16,932
	Software development	Programmers	Bachelors/masters degree	$36,788	$28,065
	IT consulting	Systems analysts	Bachelors/masters degree	$55,956	$45,455
KPO	Business and financial services	Financial analyst	Bachelors degree in Business Administration	$127,081	$47,150
Vertical activities	Engineering services	Engineer	Bachelors degree	$103,844	$53,514

Note: [a]This information is drawn from a confidential study published by Mercer (2008) for a specific country in Latin America.

Source: Fernandez-Stark et al. (2010b); IDC Latin America (2009); Meller and Brunner (2009); Mercer (2008); Wadhwa et al. (2008)

3 Market size and lead firms in the offshore services value chain

Generally, countries do not collect detailed data on service exports. There are a relatively small number of trade classification codes to accurately identify service activities and companies have little incentive to disclose this information (Sturgeon and Gereffi, 2009),

while globally consensus has yet to be reached on how to collect data that correspond to appropriate definitions of services. In addition to this dearth of available and reliable data, the different methodologies adopted to quantify the size of the offshore services industry have resulted in widely varying estimates from disparate sources. Nonetheless, several attempts at measuring the size of the industry have been made.

The estimates of the offshore services market size range from US$117.5 billion to US$281.3 billion. Figure 2 illustrates the three most reliable available estimates. According to OECD (2008) estimates, the size of the offshore services market will reach $252 billion in 2010. The OECD stresses, however, that growth rates will be different in each segment of the offshore services GVC. The OECD study, published before the economic crisis began in early 2008, projected that the global demand for BPO services, especially those related to call centres, along with those in financial services, was expected to triple between 2005 and 2010, and IT services were expected to continue growing at a similar pace. The demand for other high-value service activities was expected to reach $31 billion by 2010. This growth translates into a compound annual growth rate for the KPO segment of 58% between 2005 and 2010, much more than the expected growth rates for the demand of the BPO (25%) and ITO (26%) segments. While new estimates of the size of the industry for 2010 are not yet available, the significant decline in revenues for a number of the leading firms in the industry during the economic crisis (October 2008 to September 2009) suggests that the projected size of global offshoring for 2010 in Figure 2, published pre-crisis, overestimates the actual size of the market (Gereffi and Fernandez-Stark, 2010b).

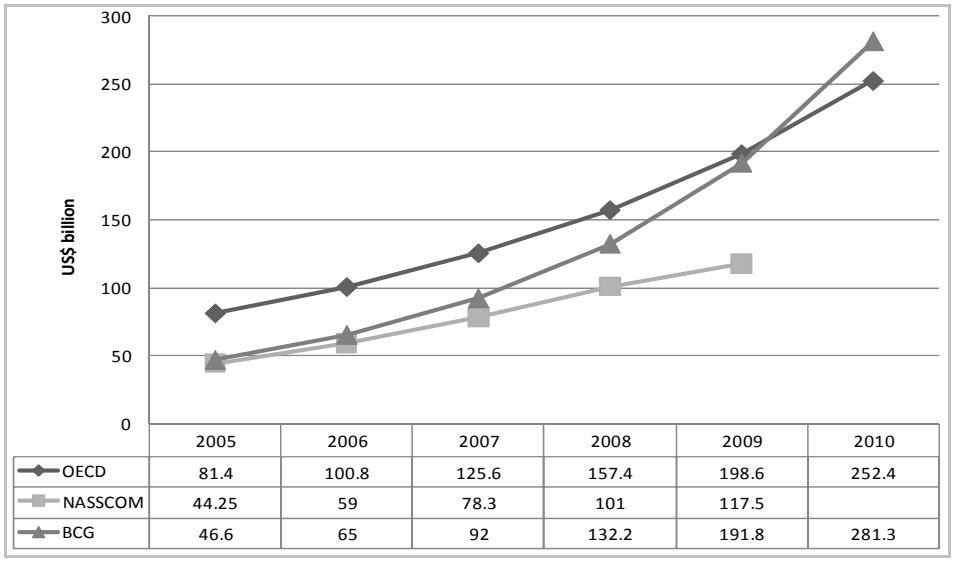
Both demand and supply have diversified geographically during the past three years. Global demand for offshore services is led by developed countries, especially the USA (Gereffi and Fernandez-Stark, 2010b), although it is increasingly being supported by an expansion of demand from developing countries.

During the recent economic crisis two effects were observed with respect to developed nation clients: the ‘demand effect’ that resulted from a contraction of demand for services from existing customers as business slowed around the world, leading annual growth rates in offshore services to decrease significantly; and secondly, a simultaneous but counteracting ‘substitution effect’, which involved the substitution of lower-price services conducted abroad for the higher-price services originally carried out inside companies in developed economies. The ‘substitution effect’ mitigated the negative impact of demand contraction as new clients in these markets began to adopt offshoring practices in order to lower costs and improve efficiencies (Wadhwa, 2008). The result was that while demand for offshore services from developed countries dipped in response to the crisis (Borchert and Mattoo, 2009), net growth remained positive and by the end of 2010, the industry was showing signs of recovery (Gereffi and Fernandez-Stark, 2010b).

In addition to the demand led by developed countries, growth in offshore services has been buoyed by new sources of demand in the South, especially from Brazil, Russia, India and China (BRIC countries) (IDC, 2010). These four countries together accounted for 38% of demand in IT services from developing nations in 2009 (Gartner, 2010b). In India, domestic demand has already begun to demonstrate compound annual growth rates (CAGRs) that are higher than those in the export sector and domestic demand is expected to continue growing faster than foreign demand. As shown in Table 2, the CAGR of the domestic market is expected to be 18.4% for the years 2007–2012, while the export market shows CAGR of 15.4% in the same period (NASSCOM, 2009b). The domestic Indian market is consuming a growing amount of generic services, thereby creating

opportunities not only for the dominant Indian providers but also for small and medium third-party providers to supply these services.

Figure 2 Estimates of the offshore services market size



	2005	2006	2007	2008	2009	2010
OECD	81.4	100.8	125.6	157.4	198.6	252.4
NASSCOM	44.25	59	78.3	101	117.5	
BCG	46.6	65	92	132.2	191.8	281.3

Notes: Activities included: three industry segments (ITO, BPO, and KPO), along with more specialised, higher value-added service activities, such as engineering services and R&D. The size estimates in Figure 2 differ in the activities they include. Generally, the high-value services segment is the most difficult to quantify; thus, it may be underrepresented here since some relevant activities may not be included.

Source: Authors based on Boston Consulting Group (2007), NASSCOM (2009a) and OECD (2008)

Table 2 Size of the Indian outsourcing market, 2007–2012

	2007	*2008*	*2009*	*2010*	*2011*	*2012*
Domestic	90,014	110,177	133,100	158,053	182,991	209,698
Export	156,594	186,142	218,107	250,087	467,657	529,976
Total	246,608	296,319	351,207	408,140	650,648	739,674

Note: In Crore (10,000,000 Indian Rupees)

Source: NASSCOM (2009b)

Brazil's IT market[5] had a CAGR of 11% in 2010 (Hermelin, 2010) and is growing even faster than India's market, already accounting for 10% of Brazil's GDP (Gartner, 2010a). Domestic IT and BPO services alone grew by almost 13% from US$17.2 billion in 2007 to US$19.4 billion in 2008 (BRASSCOM, 2008). In China, while the outsourcing market is still considered to be in its infancy, accounting for a fraction of the US market, it is quickly evolving [KPMG, (2009), p.12]. The size of Chinese outsourcing is estimated to have doubled between 2006 and 2010, reaching $US20.6 billion. Revenue from the domestic market for one of China's leading offshore services firms, VanceInfo, grew from 11.7% in 2007 to 21.5% in 2008. The market, however, continues to be undermined

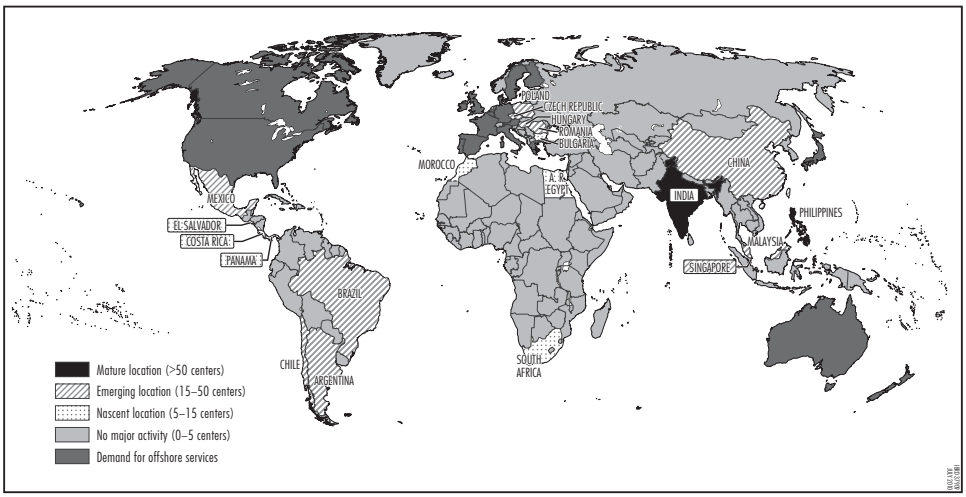
by a lack of understanding of the industry: "many Chinese companies, from state-owned enterprises to large privately held outfits, remain unsure about which business processes should be outsourced or do not fully recognize what efficiency gains can be achieved" [KPMG, (2009), p.17]. As the growing Chinese offshoring operations begin to educate local businesses about the benefits of outsourcing, this market is likely to see significant growth.

Rapid economic growth rates in these and other emerging markets have led domestic businesses to increase IT spending to help them support the challenges of fast-paced growth, manage customer support, facilitate supply chain management, and optimise their business processes. In addition, government spending is expected to drive growth in demand from developing nations as public institutions modernise to keep pace with economic growth. While these offshore services in the South are typically less sophisticated than the ones demanded by developed countries, this may change in the future when potential client firms located in developing countries engage more deeply in higher functions such are design, product development, and R&D. This demand expansion from the South for offshore services is thus gradually creating a new emerging market, although it is still small – the BRIC nations accounted for slightly less than 10% of the global IT market in 2009 (IDC, 2010). The expansion of offshore services into these emerging markets is likely to impact both upgrading opportunities and the governance structure of this GVC.

On the supply side, the 2008 crisis put increased downward pressure on prices, speeding up the search for lower-cost locations (Gereffi and Fernandez-Stark, 2010b; Lewin et al., 2009). At the same time, it highlighted the need for providers to diversify their client base to include more geographic locations. Supply has continued to spread geographically across the world, with a growing number of developing countries consolidating their entry into the industry (see Figure 3). While supply has been dominated by India, which in 2009 accounted for 45% of the global market share for offshore services (*NASSCOM Newsline*, 2009), new destinations have emerged in the Asia Pacific region (Magtibay-Ramos et al., 2008) and Latin America (Gereffi et al., 2009), and more recently Africa too is being considered a potential offshore service destination (Radwan and Strychacz, 2010). Developing country governments have begun to incorporate attractive incentive packages, including free trade zones, training subsidies, and tax concessions, to encourage firms to set up operations in their countries.

Despite the diversification of supply across the globe, the companies providing these services have become increasingly consolidated as the industry has matured (Gereffi and Fernandez-Stark, 2010b). The industry is organised in three major groups of lead firms: first, captive or shared services centres; second, third-party providers from developed countries; and finally, third-party providers from India. The first group of firms refers to MNCs that established 'captive centres' in developing countries in the early 1990s, as they offshored their business activities abroad in order to find lower-cost and appropriately skilled workers. Captive centres, also named shared service centres, allowed these MNCs to keep service operations in-house opening subsidiaries in developing countries. However, in the late 1990s many MNCs decided to sell these operations to third-party providers to further reduce costs. In this process, a great deal of knowledge transfer occurred and developing countries benefited significantly from this new type of corporate reorganisation (Sako, 2006). The decline of these captive centres gave way to the division of the market into two groups of large firms that dominate the supply of offshore services.

Figure 3 The global supply and demand for offshore services



Note: The demand for offshore services is primarily from developed countries, although recently demand for offshore services has begun to emerge and expand from the South.

Source: Center on Globalization, Governance & Competitiveness (CGGC), Duke University, based on data from Everest (2009) and Datamonitor, 2009.

The second type of lead firms is well-established third-party providers from developed countries that began exporting services in the 1990s. These firms entered the industry by using their subsidiaries in developing countries as platforms for service exports. These include third-party providers such as IBM, Accenture, EDS (now HP enterprises), and Capgemini. The large global service providers operating in the offshore industry are principally dedicated to serving large MNCs and governments. These firms established services platforms first in India, then in Central and Eastern Europe, and later in Latin America. In 2007, Accenture employed more people in India than anywhere else in the world. By 2006, IBM had 60,000 employees in India, and Capgemini employees there had reached 12,000 (Dossani and Kenney, 2007).

The last set of lead firms is Indian third-party providers that emerged in the service sector in the late 1990s and includes Tata Consultancy Services, Infosys and Wipro, among others. These firms emerged despite an unpredictable business environment in India, and their growth has led to significant changes within Indian institutions (Athreye and Hobday, 2010). They established a sophisticated system to leverage global time zones around the world called the Global Delivery System (GDS), whereby they maintain headquarters in India, delivery centres in developing countries, and customer support offices in developed countries (early to mid-2000s). This system ensures uninterrupted services for clients. These firms have established delivery centres in developing countries, supported by generous government incentives that aim to position their countries as export service platforms to the world. In doing so, Indian firms have also successfully gained access to unexploited domestic and regional markets in the South. Today, they use the GDS to serve both local and export markets, allowing them to geographically diversify their revenue streams. Indian firms have grown at significantly

higher rates than firms from the developed world, despite the fact that both firm types have leveraged India's low costs in their offshore service operations.

Table 3 provides an overview of leading Indian offshore service providers in Latin America. Indian firms have expanded aggressively into Latin America and opened numerous delivery centres between 2000 and 2010, especially in the region's largest economies, Brazil, Mexico, and Argentina (Gereffi et al., 2009; Laughlin and Camino, 2010). TCS's Chilean delivery centre is the firm's largest outside of India, accounting for 13% of the company's non-Indian labour force (*The Times of India*, 2010).

Table 3 Top Indian offshore service providers in Latin America (FY 2009–2010)

Company	*Countries*	*Year of entry*	*Number of employees, Latin America*	*Number of employees, total*	*Revenues, total (USD millions)*
Tata Consulting Services (TCS)	Argentina	2005	7,000	160,429	$6,327
	Brazil	2003			
	Chile	2003			
	Colombia	2006			
	Ecuador	2007			
	Mexico	2003			
	Uruguay	2002			
Wipro	Brazil	2006	850	108,071	$5,826
	Mexico	2007			
Infosys	Mexico	2008	330	113,796	$5,826
Cognizant	Argentina	2008	250	95,600	$3,279
HCL Technologies	Brazil	2009	150	70,218	$2,704
Mahindra- Satyam	Brazil	2007	100	50,570	$1,240

Source: Based on information from diverse sources: online databases such as OneSource, Hoovers and DataMonitor; company annual reports; telephone interviews; media information; newspapers; and press releases.

The significant market power of these lead firms in the offshore services value chain has made it difficult for local companies to compete in developing countries. With the exception of those countries with large MNCs, which have established local service providers to meet the needs of sizeable domestic markets, local firms have not been able to compete with international providers for major contracts. To lessen risk and facilitate service provision, big buyers prefer to source from well-established firms with solid global reputations. The large global providers can leverage the same workforce, with economies of scale and organisational learning, to provide services at lower costs and with lower risk to the client than local firms (Laughlin and Camino, 2010).

The new demand emerging from clients in the South, however, is providing opportunities for smaller suppliers to enter the value chain. Four categories of

suppliers are meeting this demand: the first is Indian third-party providers located in the South (particularly notable in Latin America); the second includes providers from the South serving demand in other countries in the South; the third category consists of domestic companies; and the fourth, although to a lesser extent due to the limited size of the contracts, large global third-party provider firms from developed countries. This growing demand offers business opportunities for third-party providers in categories two and three, located in the South, to enter the outsourcing service industry that would otherwise be unable to compete for large contracts with the global and Indian providers (KPMG, 2009; Wadhwa, 2010).

In particular, some of the larger, non-Indian Southern firms have been able to leverage comparative advantages of price, time zones and expertise to provide services regionally, a new market that is expanding rapidly. Sonda, Chile's largest IT services firm, is the key example of regional consolidation. The company employs 8,000 workers across Latin America with revenues of US$671 millions in 2008. The company has strategically focused on expanding only within the region, establishing operations in Argentina, Brazil, Colombia, Costa Rica, Ecuador, Mexico, Peru and Uruguay. The company uses its numerous regional operations to provide a range of offshore services from low value-added to very sophisticated services. In addition to a wide variety of private sector clients, including Brazilian MNCs such as Embraer and Petrobas, it has also provided the central government procurement systems to Chile, Panama and Colombia (Peña, 2009).

In this complicated network of business-to-business activities, multiple governance structures within the offshore services GVC are beginning to emerge. Governance structure refers to the global organisation of the industry, paying close attention to the coordination and key drivers among different actors of the GVC. Gereffi et al. (2005) identified five governance categories: markets, modular, relational, captive and hierarchy.[6] Table 4 illustrates how governance structures differ at different stages of the offshore services value chain.

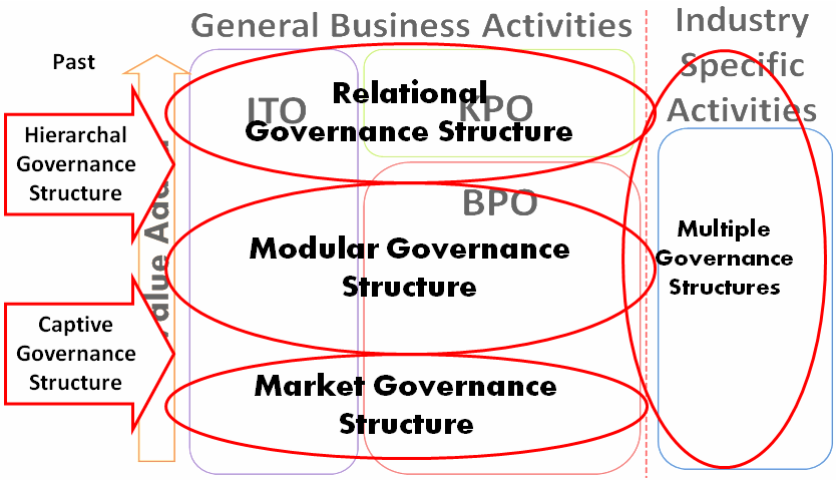
Figure 4 links the various types of governance structures identified in Gereffi et al. (2005) to the offshore services value chain. In lower value stages of the chain, the 'market' governance structure tends to predominate (see Figure 4). When buyers within the offshore services value chain simply expect access to low-cost labour, the interaction between the buyer and supplier is limited. Suppliers in this case provide services according to the customer's specifications. The supplier is expected to provide the required competencies to fulfil the service obligations. This is seen with the commoditisation of several services, including call centres, low value IT services, and finance and accounting (Couto et al., 2007). These routine services are non-complex and can be easily codified, standardised and transferred. Buyers select their services from multiple providers principally based on cost. Increased complexity in transactions, such as the expansion into higher value BPO services such as human resource management, requires more interaction and coordination between the client and the supplier and the governance structure becomes more 'modular'. Service providers in this case operate in a similar manner to the global contract manufacturers in production chains (see articles by Sturgeon and co-authors on the automobile and electronics value chains in this special issue of *IJTLID*), where they are contracted to provide comprehensive 'blocks' of services.

Table 4 Types of governance structures in the offshore services value chain (see online version for colours)

Governance type	*Complexity of transactions*	*Ability to codify transactions*	*Capabilities in the supply-base*	*Degree of explicit coordination and power asymmetry*	*Offshore services value chain segment*	*Example*
Market	Low	High	High	Low → High	Low value added BPO	Third-party providers call centres in Central America. For example, Sitel in Nicaragua
Modular	High	High	High		High value added BPO	BPO services such as accounting and payroll carried out by Infosys BPO in India.
Relational	High	Low	High		KPO, high value added ITO and high value added services in industry specific activities	R&D services for pharmaceutical MNC, Roche, by TCS in India
Captive	High	High	Low		IT and BPO operations sold recently to third party providers	The acquisition of Unilever BPO operations by Capgemini in Chile
Hierarchy	High	Low	Low		'Captive centres' in IT and BPO	A large number of MNCs that opened captive centres in East and Central Europe and as well as in Latin America. Captive Centers in Costa Rica include: Astra Zeneca SS, British American Tobacco, Chiquita Brands, Citi Business Services, DHL, Intel, Oracle and Procter & Gamble GBS.

Source: Authors' interpretation, based on Gereffi et al. (2005)

Figure 4 Multiple governance structures within the offshore services value chain (see online version for colours)



Note: To see full version of GVC background diagram, see Figure 1.

As the client firm begins to demand higher value services from the supplier, and a greater degree of interaction is required between the two parties, a 'relational' governance structure emerges (see Figure 4). Using data gathered by surveys carried out by the Duke Offshore Research Network (Couto et al., 2007; Lewin and Cuoto, 2007) and by the National Academy of Sciences in 2005 that examine the offshoring of R&D and innovation practices of more than 200 large MNCs, the following characteristics for these high value services can be determined. These knowledge services are unique, non-repetitive and complex in nature, and there is a high degree of coordination between the two parties (Thursby and Thursby, 2006). The buyer is driven primarily by the search for talent, expertise and access to local know-how. In R&D services, client firms rely on their local R&D partners' competencies in serving the local markets to collaborate on the development of new products for those markets. For high value services, such as new product development, the relationship between client and supplier is fundamentally based on trust, particularly as many of the developing countries where the services are being carried out have poor intellectual property protection and weak contract enforcement. In many cases, challenges related to this weak intellectual property protection have led to MNCs maintaining their offshored R&D operations in-house, or through joint ventures (in these instances, the preferred governance structure is either hierarchical (in-house R&D) or captive (joint-ventures) rather than relational.

However, as each of these segments of the industry emerged, the relationships governing the segment have also evolved. When the industry was initially established, a 'hierarchical' governance structure was prominent; captive centres operated by MNCs opened in developing countries taking advantage of the changes brought about by the IT revolution. Capabilities in host countries were low and the concept of conducting services in one country to be consumed in another was highly novel. There was a great deal of oversight of the foreign service centres by companies in the developed world and a high degree of knowledge transfer. This gave way to a 'captive' governance structure as these foreign subsidiaries increased their competency levels and were slowly spun off or sold

to global third-party providers or Indian firms, although the majority of the control was held by the MNCs as principal buyers. These providers were 'learning' how to operate across time zones and borders, and their principal clients influenced their processes significantly. More recently, developing countries have acquired certain expertise and more activities are being codified, leading to a 'modular' governance structure in high value added BPO activities in which the complexity of the transactions are high, while at the same time a 'market' governance type has been created with the commoditisation of low value added BPO activities such are call centres. Finally, as more sophisticated services are demanded, a shift from 'hierarchical' and/or 'captive' to 'relational' governance is occurring as firms move from in-house/joint venture operations to fully outsourced service provision in which there are complex interactions and mutual dependence between buyers and seller.

The above analysis is based on the dominant market structure, with service provision occurring in developing countries for developed country buyers. As demand continues to expand in the South, new governance relationships may emerge. Early analysis suggests that large, experienced providers from the South are able to provide local companies with world-class solutions, shifting towards a supplier-driven chain. On the other hand, smaller providers looking to create innovative solutions for domestic clients, particularly with respect to social and local issues (Wadhwa, 2010), are developing more collaborative relationships characteristic of relational value chains.

4 Developing countries in the knowledge economy

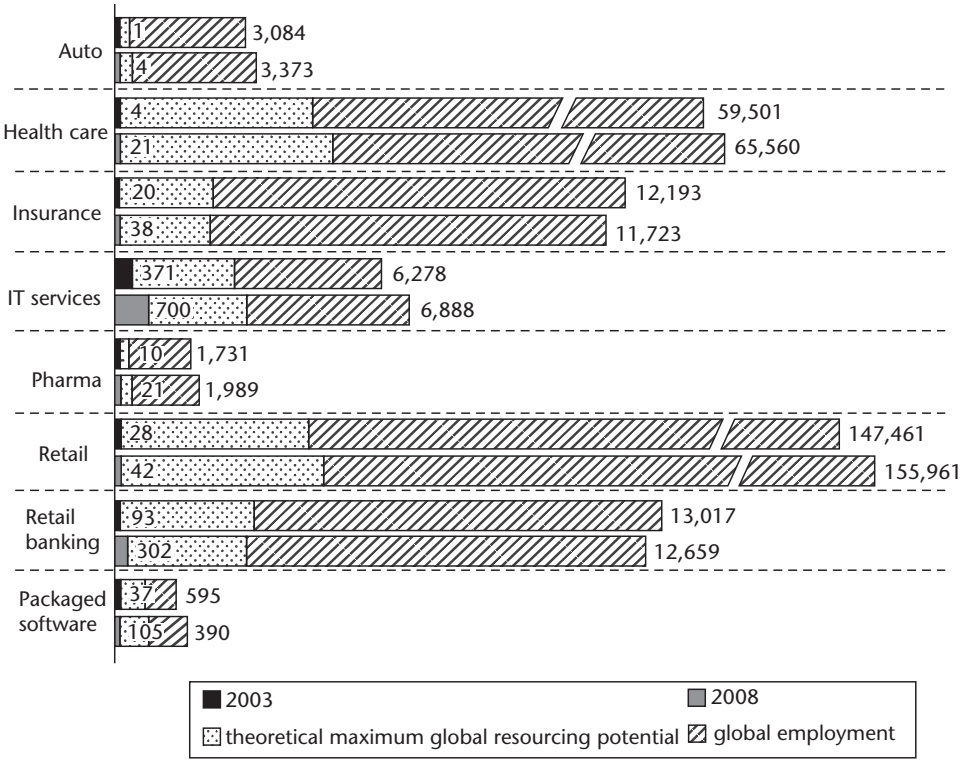
In production or manufacturing-based economies, key sources of competitive advantages can be identified as large pools of unskilled labour and an abundance of raw materials. With an ample supply of both, many developing countries have become essential parts of global production chains. This is clearly illustrated by the strong African suppliers in agriculture and horticultural chains (Dolan and Humphrey, 2004), China's role as the world's assembly plant (Dicken, 2007), and Vietnam's rise in the apparel industry (Gereffi and Frederick, 2010; Thoburn et al., 2005; Thomsen, 2007). However, in the knowledge economy, information, innovation, education and expertise are the key sources of competitiveness (OECD, 1996). Several developing country governments see the offshore services industry as a great opportunity to develop their economies, drawn by key positive impacts the sector affords the local economy: employment creation in higher skilled and better compensated jobs, linkages with global markets and learning opportunities, and enhanced resilience to economic downturns.

First, the direct and indirect employment effects generated by the offshore services industry are significant. While still in its nascent stages, in many developing nations offshore services have been the fastest-growing industry in recent years, creating a host of new jobs. In India, offshore service employment shows growth rates of close to 25% annually. In 2004, the industry employed 0.8 million and in 2009 employment reached 2.3 million (NASSCOM, 2009a). It has been estimated that up to 161 million jobs can be performed remotely (McKinsey Global Institute, 2009). Yet, global employment in offshore services had only reached 4.1 million by 2008, indicating that the vast majority of its potential remains untapped.

In Figure 5, the shaded bars represent the adoption of offshore practices in the years 2003 (darker) and 2008 (lighter). In just five years (2003–2008), this industry has

demonstrated rapid growth. However, the dotted bar presents the vast opportunities that still exist to offshore activities across different industries. The graph also highlights the emergence of new segments in the GVC, including industry-specific offshoring in retail banking and the health care industry (McKinsey Global Institute, 2009). Furthermore, while resulting in an increase in direct employment, it is estimated that an additional four indirect jobs are created for every offshore services job that is established (ECLAC, 2008; NASSCOM, 2009a). Offshore services employment is also regarded as better than many production jobs. They are typically better paid, the hires come from groups that often experience high unemployment rates (youth and women), they can be geographically dispersed within a country, brain drain is reduced by providing employment opportunities at home, and they establish a culture based on learning and continuous development (ECLAC, 2008). This industry hires mostly workers with tertiary education. Lately, enrolment in tertiary education in developing countries has seen an increase. A growing number of people from low socioeconomic levels are thus increasingly able to access employment in this sector. In Chile, 70% to 80% of students enrolled in one of the country's largest IT technical institutes, DuocUC, were the first generation to enter higher education (Barriga, 2009).

Figure 5 Actual and potential adoption of offshore practices



Notes: Actual adoption of offshoring assesses the current and projected level of offshoring to low-wage countries within a sector. Theoretical maximum global resourcing potential describes the percentage of a sector or function that may be performed remotely.

Source: McKinsey Global Institute (2009)

A second benefit is the establishment of international linkages with global markets that drive learning and technological growth in developing countries (Morrison et al., 2008). Entry into the offshore services value chain facilitates the development of sophisticated products and services that the local market cannot yet appreciate. Athreye and Hobday (2010) argue that technology products in particular often face adverse demand in developing countries because the relatively low income of consumers and firms favours goods and services with low prices rather than those of higher quality. Demand for IT-enabled services within the domestic markets in India, for example, initially trailed that of its export market. However, this trend has now been reversed with a growing number of domestic companies adopting similar outsourcing strategies as developed economies to help support growth (NASSCOM, 2009b). Thus, engaging with clients in the developed world helps to increase the level of sophistication of exports. In turn, increased sophistication of the exports of these developing countries is considered an important determinant of their future growth prospects (Hausmann et al., 2007).

Recent evidence suggests that the offshore services industry has a contra-cyclical nature. The economic crisis of 2008 highlighted the weaknesses of economies based on commodities and manufacturing (Borchert and Mattoo, 2009). However, the offshore services industry continued to grow in these periods owing to its principal purpose to lower costs and thus improve competitiveness for its clients (Gereffi and Fernandez-Stark, 2010b). This may provide improved economic stability in developing countries.

5 Upgrading trajectories in the offshore services industry

The emerging pattern of geographic diversification of the offshore services industry described in this article has revealed country-level economic upgrading not dissimilar to that which has occurred in production-based value chains. Upgrading in this context refers to "a process of improving the ability of a firm or an economy to move to a more profitable and/or technologically sophisticated and skill-intensive economic niche" [Gereffi, (1999), p.51]. Upgrading occurs when multiple firms or key lead firms within a country begin to provide higher value added services. In the case of the offshore services industry, this upgrading has been driven in the private sector on the demand side by clients seeking more advanced services, as well as on the supply side by entrepreneurs and large firms alike looking to exploit new, innovative opportunities within the industry (Athreye and Hobday, 2010; Wadhwa, 2010). The public sector's principal role to date in upgrading has been supportive, mainly providing incentives for entry into the value chain and subsequent workforce development. The following discussion of upgrading in the offshore services industry is based on the analysis of ten developing country case studies of a cross section of nations that have entered or attempted to enter the industry since its inception (Fernandez-Stark et al., 2010b). These include Barbados, Chile, Costa Rica, Czech Republic, Guatemala, Honduras, India, Ireland, the Philippines and South Africa.

There is consensus among researchers and industry experts alike that the principal factor underlying the location of service centres in offshore services is both the quantity and quality of the available human capital. As the key factor of production, human capital and a country's ability to develop its workforce are central to its ability to upgrade (Fernandez-Stark et al., 2010c).[7] However, education systems in many countries, and in developing countries in particular, remain limited and inflexible in the face of changing

demand of the labour market (World Bank, 2000), and frequent mismatches are seen between formal education programs and skills required by the labour market (Handel, 2003). In particular, emphasis is placed on theoretical and technical knowledge, and the growing importance of the interpersonal skills and global understanding required for success in the workplace is underestimated. In those industries where software and technology play a central role, technical expertise is constantly changing and must be continuously updated, making 'soft' skills such as adaptability, creativity and life-long learning vital to ongoing success (Gallivan et al., 2004). In offshore services, knowledge in languages, cultural intelligence, teamwork abilities and a global perspective are also paramount (Fernandez-Stark et al., 2010c). Thus, the skills required for industry upgrading are most often attained through focused workforce development initiatives. These initiatives are designed to meet the needs of MNCs that expect quality standards similar to those in developed countries (Fernandez-Stark et al., 2010b).

Important differences in the quantity of labour required through each stage of the value chain are particularly relevant a country's upgrading potential. Analysis of firms in the countries studied shows that the lower levels of the value chain require a significantly larger number of employees than higher levels. Firms such as India's Infosys have approximately 50,000 employees in their basic business service operations. Competitive advantage in lower levels of the value chain is focused on abundant labour with basic preparation that requires efficient training to produce adequate numbers of employees. Athreye and Hobday (2010, p.39) credit this for India's success, noting the industry exploited its initial advantage in low-cost human capital by fashioning business models that leveraged this strength.

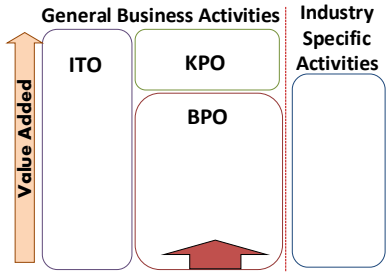
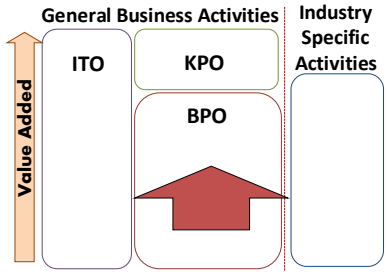
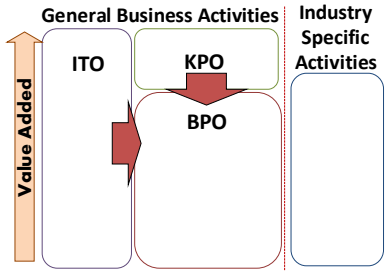
When moving up the value chain, however, the need for quantity is surpassed by the demand for quality, and the industry requires fewer, but more highly qualified personnel. The competitive advantage for higher ends of the value chain including 'high value knowledge services' are derived, as Porter argues, from a small number of highly skilled persons or 'talent' (Porter, 1990). A growing literature on the offshoring of innovation and research development confirms that the search for talent is the key decision-making factor in location selection (Lewin and Cuoto, 2007; Thursby and Thursby, 2006).

We find distinct workforce development strategies for the diverse upgrading trajectories in the industry. Certain activities, particularly in the BPO segment, only require short-term training; in other cases formal education and globally recognised certifications are mandatory to move to higher value–added activities, particularly in R&D stages. Nonetheless, a general pattern of engaging the workforce has emerged. Formal education through the country's established education system is complemented by specific training to fill the knowledge gap between education systems in developing countries and high quality standards required to serve the global market. Demand-driven training has been the most effective way to impart specific skills needed by the offshore services companies. This type of training has provided a rapid and efficient solution in filling the skills gap.

Within the GVC framework, upgrading can be classified in four different ways: *process upgrading*, which transforms inputs into outputs more efficiently by reorganising the production system or introducing superior technology; *product upgrading*, or moving into more sophisticated product lines; *functional upgrading*, which entails acquiring new functions (or abandoning existing functions) to increase the overall skill content of the activities; and *chain or inter-sectoral upgrading* where firms move into new productive activities (Humphrey and Schmitz, 2002). Adapting this scheme to our case evidence,

five principal upgrading trajectories can be identified from the ten country case studies: Entry into the value chain; upgrading within the BPO segment; offering broad spectrum services; the expansion of IT firms into KPO services; and the specialisation of firms in vertical industries.[8] These five upgrading trajectories are presented in Figure 6 and discussed in further detail below.

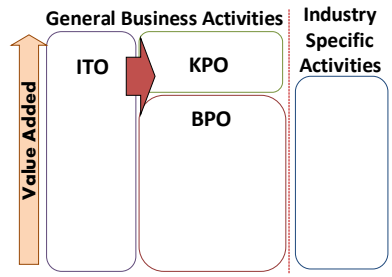
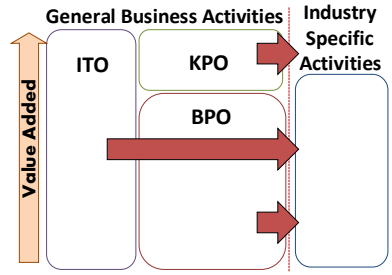
Figure 6 Examples of upgrading trajectories in the offshore services value chain (see online version for colours)

Type	*Diagram*	*Description*
Entry into the value chain		• Common way to enter the offshore services value chain is through the establishment of call centre operations. • Opportunity for low-income countries to enter into the knowledge economy. Recent examples of countries entering the value chain through call centres include El Salvador (Dell, Sykes and Teleperformance), Nicaragua (Sitel), Panama (HP and Caterpillar) and Guatemala (Exxon Mobil, ACS and 24/7 Customer) (Gereffi et al., 2009).
Upgrading within the BPO segment (functional upgrading)		• Companies expand their BPO services within the segment. • Improving and expanding call centres operations or specialisation in certain areas. South Africa has been an important destination for BPO services currently employing around 87,000 people and growing at 33% per year. South Africa is actively working in expanding their BPO activities (Everest Group and Letsema Consulting, 2008; Sykes, 2010).
Broad spectrum services (functional upgrading)		• Companies positioned in the ITO and KPO segments may opt to provide a more comprehensive range of activities and include BPO services. • Acquisitions of smaller BPO firms and/or creating a new business unit within the company. India has seen a number of firms in the IT and consulting (KPO) segment expands to the BPO sector. This is true for both big domestic firms like Infosys, Wipro and also foreign firms located in India like IBM and Accenture among others.

Note: *To see the full version of GVC background diagram, see Figure 1.

Source: CGGC, Duke University

Figure 6 Examples of upgrading trajectories in the offshore services value chain (continued) (see online version for colours)

Type	*Diagram*	*Description*
Upgrading from ITO to KPO functions (functional upgrading)		• IT service firms include KPO activities in their portfolio. • IT companies engage customers to find solutions for unsolved business problems. For example, between 2002 and 2005, Indian firms Infosys, Wipro, TCS and WNS amongst others developed and launched business consulting services practices.
Industry Specialisation (intersectoral upgrading)		• Companies offering some ITO, BPO and KPO services for a wide range of industries start specialising and focus on key industries to develop expertise. The Czech Republic, which entered into the offshore services industry through the establishment of BPO shared services activities, has quickly upgraded into R&D segments of vertical industries, particularly in the automotive, aerospace and IT areas (Business and Innovation Center- Brno, 2009).

Note: *To see the full version of GVC background diagram, see Figure 1.

Source: CGGC, Duke University

Trajectory 1: Entry into the value chain. This has been achieved by developing countries principally through the provision of call centre services, a BPO activity. The Dominican Republic, El Salvador, Guatemala, Honduras, Jamaica, Nicaragua and the Philippines have entered the offshore services industry by providing call/contact centre services. This segment draws on previously marginalised labour markets, in particular youth and female labour pools, hiring a large number of young workers with high school diplomas and in some cases basic tertiary education. Hiring practices in the segment do not discriminate between educational or technical disciplines, facilitating access to a deeper labour pool in this smaller labour market. These operations rely on scalability in order to drive profitability, suggesting that these are best suited for developing countries with large populations.

The success of the Philippines in the call centre industry to become a strong competitor with India is mostly attributed to its large, English speaking youth population. Work in call centres in the Philippines is highly respected within the Filipino community and, while the industry has access to some of the lowest costs in the industry, call centre agents earn a good salary by Filipino standards. Training programmes are short and typically carried out by the private sector. "On the job training is very important in these establishments. Most newly hired agents are involved in a period of mentoring during which more experienced workers will sit next to them and listen in on their calls in order to give feedback" [Sieben et al., (2009), p.554]. In some cases, such as the Philippines, the government has provided this training or it provides incentives to encourage training,

as in Chile. In Guatemala, inter-institutional alliances were created to promote call centre skills training. Intecap, a technical training institution funded through a 1% levy on salaries, has been central to these initiatives (ECLAC, 2009).

A limited number of countries with slightly higher income levels including Chile and Ireland demonstrate a mixed approach with simultaneous entry into the ITO and BPO segments, while India is the only low-income country to have entered the value chain directly through ITO services. Entry into the value chain through the IT segment is more complex for developing countries due to the challenges of providing services for customers they do not know without a domestic market to drive growth. These services require basic levels of computer literacy generally absent in low-income countries, and the limited labour pool with pre-existing knowledge of computers in low-income countries may not consider offshoring as an attractive career alternative. Despite these challenges, many governments from low-income countries have supported and encouraged the development of the IT services industry, but they have yet to enter the global IT chain. India appears to be the exception. The country has a large labour pool to support the IT services operations, with over 300,000 three- and four-year engineering, computer science and IT services graduates per year (NASSCOM, 2006). India is at the leading edge of offshore services. India's first mover advantage, combined with its significant competitive advantage in IT personnel, has made it difficult for other countries to enter the global industry and compete effectively with the depth, vendor maturity, cost structure and scalability of the Indian firms.

Trajectory 2: Upgrading within the BPO segment. This encompasses the shift from basic services (call centres) to the provision of higher value added services within BPO, a common trend for countries entering the GVC through the BPO segment. This upgrading is seen in firms in the small countries of the Caribbean that have entered offshore services through the BPO segment as well as in South Africa and the Philippines. In the Caribbean region, offshore service firms have entered these countries principally to provide call centre services in Spanish (incoming and outgoing) for the Hispanic market in the USA, but they have rapidly offered additional services as well. Firms first expanded their services to include English-speaking agents (product upgrading), while some companies in an effort to meet global requirements for data protection, sought certification in ISO data security standards (process upgrading). Following this, a number of firms moved into providing more back-office BPO services, such as finance, accounting and payroll (functional upgrading).

The learning curve associated with overcoming the challenges of exporting services during the introduction of call centre operations can be quickly leveraged to both improve upon current services and upgrade into higher value services. Higher value BPO activities rely on similar repetitive functions as call centres, although as a whole, they draw on a slightly more educated labour force. Limited direct interaction between clients and agents facilitates growth of these functions as they do not depend on language fluency, in turn allowing access to a broad base of potential employees. Training in BPO functions is predominantly carried out by the private sector and on the job, with employees receiving training and support from a team leader. In some cases, such as in South Africa and Chile, the government has provided financial support for training for both direct jobs and middle management in the BPO segment.

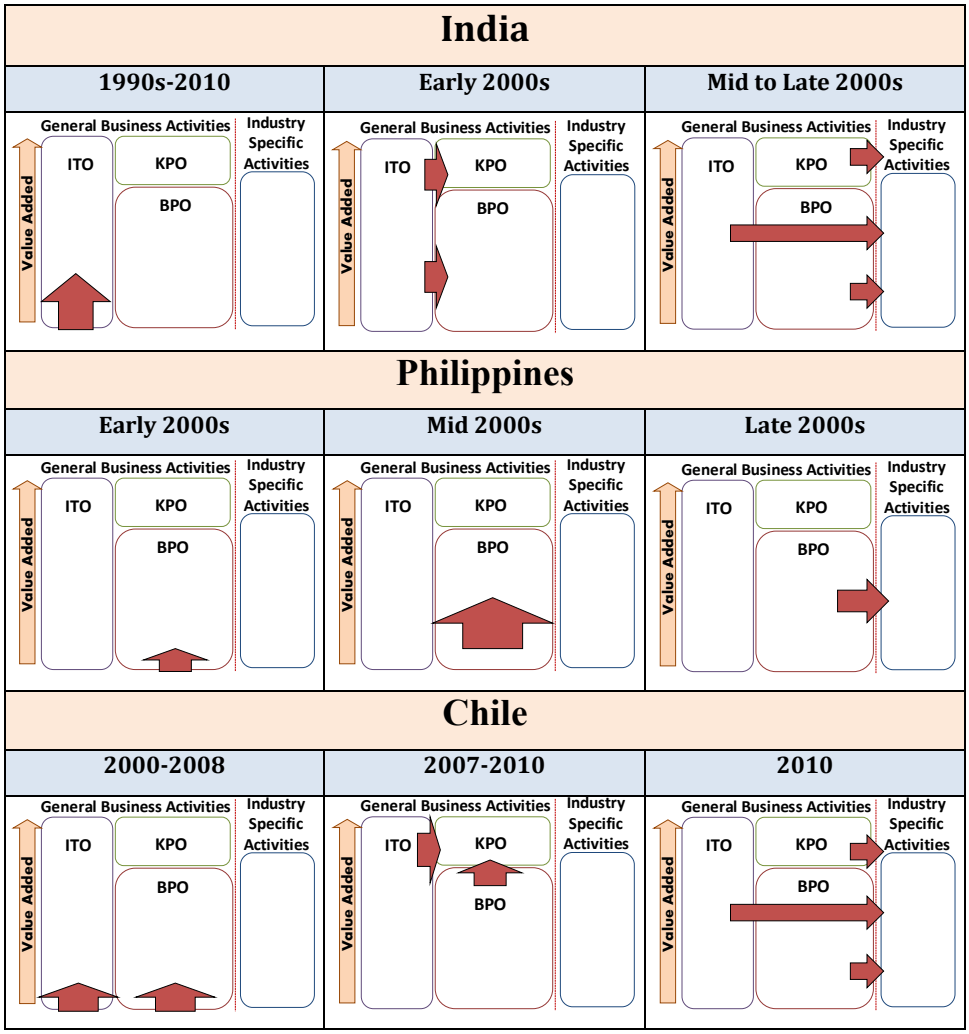
Trajectory 3: Broad spectrum services. This trajectory describes functional upgrading to offer all services in the ITO, BPO and KPO segments. Maintaining the provision of low

value services while at the same time providing high valued services requires a large but versatile low-cost labour supply. In small countries, inflationary pressure on wages due to a limited but skilled workforce encourages countries to upgrade into higher value services, or lose their competitiveness in the industry to other lower cost countries. On the other hand, a large country with a significant proportion of the population earning low salaries can successfully upgrade into higher value services and at the same time remain competitive in basic services. To date, only India has been able to achieve this degree of upgrading, providing at once sophisticated KPO services in legal and business intelligence and low value call centre operations. As the first mover and leader of the industry, the evolution of offshoring in India is atypical. BPO services emerged only after the ITO segment had developed its strength in India. It has been argued that the emergence of the BPO services sector in India, at that time, was the result of the dominance of the large IT firms (Athreye and Hobday, 2010). Indian entrepreneurs who were looking to take advantage of the advances in IT and leverage India's significant competitive advantage in labour were unable to compete directly with these large firms, and thus they created the BPO market. Indeed, Indian start-ups continue to create and exploit new niche segments within the offshore services market, and most recently have begun to focus on building sophisticated R&D solutions for the developing world (Wadhwa, 2010).

Trajectory 4: Upgrading from ITO to KPO. The shift of ITO providers into KPO activities is driven by a need to engage customers to find solutions for "unsolved business problems rather than incomplete programming tasks" [William F. Achtmeyer Center for Global Leadership, (2008), p.3]. IT firms leverage their successful global approach to the technology industry by becoming players in the business-consulting field. This upgrading trajectory has been observed in India, Chile, Ireland, and Israel, and it has been facilitated by the recruitment of personnel with higher education qualifications. Firms hire a large number of MBA graduates and workers with business experience and sharp analytical skills. Legal process outsourcing (LPO) requires qualified lawyers. It is estimated that by 2010, LPO will employ 40,000 professionals globally (Sako, 2009). These lawyers undergo similar training as in the USA.

Trajectory 5: Industry specialisation (intersectoral upgrading). Companies offering some ITO, BPO and KPO services for a wide range of industries often specialise and focus on key industries in which to develop expertise. This trajectory is closely correlated with leading productive industries in the host country. Companies hire area experts to sustain their competitive advantage in specific niche areas, drawing on available pools of highly qualified human capital. Countries that have followed this trajectory include the Czech Republic, Chile, Israel and South Africa. The Czech Republic entered the offshore services industry through the establishment of BPO shared services activities but quickly upgraded into R&D segments of vertical industries, particularly in the automotive, aerospace and IT areas (Business and Innovation Center – Brno, 2009). Inflationary pressure, caused by the high demand for labour from a small workforce, quickly forced the country to change its offshoring approach to focus on higher value activities. In Chile, the export of engineering services related to mining are the third largest service export sector (Fernandez-Stark et al., 2010a). Israel has targeted high value security offshoring, particularly in cyber security, while in South Africa, services are increasingly focused on the financial services sector drawing on the country's position as the financial capital of Africa.

Figure 7 Offshore services upgrading: India, Philippines and Chile (see online version for colours)



Note: To see the full version of GVC background diagram, see Figure 1

Source: Authors

The above analysis of these trajectories indicates that upgrading in the offshore services industry is non-linear and can move in different directions and multiple shifts could take place simultaneously. Figure 7 compares the trajectories followed by India, Chile and the Philippines, highlighting the differences in upgrading processes across countries with different characteristics.

The expansion of demand to include client firms in developing countries is likely to have an important impact on the upgrading processes of providers. Indian firms in particular have been looking towards domestic markets to drive upgrading. Consulting firm Ernst & Young notes that in their home markets "[these firms] get to handle larger projects that offer opportunities to move up the value chain, which are difficult to come by in the developed markets. This helps Indian IT firms develop capabilities that can be

leveraged in other emerging markets like Brazil and newer markets like Africa" (Global Services, 2009).

In addition, upgrading in offshore services provides opportunities to other low-income countries to enter into this value chain. Early market entrants rapidly specialised in service areas in which they have a competitive advantage. As they upgraded to higher-value activities, new countries joined the industry at lower points in the value chain. This dynamic thus opens up opportunities for new countries to enter this chain and to continue to find high-value activities within it. Chile's shift into higher value services, for example, has made way for Peru and Colombia to enter the value chain. Due to the resulting upward pressure on wages, call centre operations previously based in Chile have begun to be relocated to other Latin countries (El Mercurio, 2010). This has also been seen to occur within countries, such as in India and the Philippines, when Tier 1 cities moved into higher value services, Tier 2 and Tier 3 cities, as well as many rural villages (India Knowledge@ Wharton, 2010) began to enter the industry in call centres in particular. This shift provides emerging economies with an opportunity to drive sustainable growth through the expansion of the knowledge economy and to reduce their traditional dependence on manufacturing and natural resource industries.

6 Conclusions

The offshore services industry is a new and rapidly growing sector that has important implications for the growth of developing countries and their integration into the knowledge economy. The industry was initially driven by the unbundling of MNC business activities and the offshoring of low value added activities in the search to reduce costs by sourcing cheap labour. However, the level of sophistication of services being offshored has increased substantially over time, and today even core business activities such as R&D are being carried out by firms in the developing world.

Demand for these offshore services has principally been driven by firms in the developed world. More recently, developing economies have begun to demand these services, creating a new market. Several Indian service providers have taken advantage of this expansion of the South by locating their operation centres in developing countries. This allows them to not only use those nations as a platform to export services, but also to serve their growing domestic markets. Since demand from the South is currently focused on more generic and basic services, this also provides an opportunity to domestic service providers that cannot compete for global contracts leading to increased regional trade.

As the industry has evolved, upgrading to new or higher value services has taken place in various developing countries, offering new opportunities to enter this industry and provide lower value services. The global expansion of the sector has accelerated and a clear majority of developing countries are actively attracting service providers that will use their countries as export platforms. The offshore services industry has offered important economic and social benefits for emerging nations, including access to new markets, more and better employment, and secure income during global economic downturns.

Different upgrading paths have been identified. Overall, upgrading trajectories have been driven by workforce development in which different initiatives and institutions have been engaged to improve the skills of the workers according to global standards. Due to the global nature of the industry, specific skill gaps need to be addressed, such as

language and intercultural awareness, as well as a number of soft skills that are fundamental to interact successfully and understand the needs of global clients. In the effort to upgrade the industry's workforce, several actors have been involved, including the private sector, the government and tertiary education institutions.

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Notes

1 See Figure 2 for data and a discussion on the size of the market.

2 Employment information accounts only for offshore work and it does not include domestic activities.

3 This classification was developed based on a series of interviews of leading firms in the industry in India and in Chile carried out between 2007 and 2009, compiling comprehensive employee, service, and client information, and complemented by secondary sources, including industry reports and ten country case studies.

4 This industry has continued to grow and evolve rapidly and while the GVC presented in this article incorporates all activities conducted within this industry to date, each of the individual segments (ITO, BPO and KPO) can be considered as a separate value chain.

5 This figure includes both software and services as well as hardware sales. In 2008, hardware accounted for approximately 55% of IT spending in Brazil (BRASSCOM, 2008). While this figure is a significant proportion of spending, it does indicate the growing prevalence of information technology in the country, which will ultimately lead to an increase in spending on IT services.

6 For a detail explanation about governance structures see Gereffi et al. (2005).

7 Competitive advantages in language and cultural similarities and time zones are important for initial entry into the value chain, yet these factors remain constant and can be leveraged in all stages. Thus, these do not account for major shifts in ongoing upgrading or downgrading trajectories.

8 Process upgrading is also identified, however, due to marginal returns to economic development from this type of upgrading in offshore services, it is not discussed in detail in this paper.

Labour standards and technological upgrading: competitive challenges in the global football industry

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Abstract: Football manufacturing is a billion dollar industry heavily dominated by major global brands. Over the past 15 years there have been significant changes in the geographies of production with China consolidating its position as the number one football producer taking market share from Pakistan, the second largest producer. On the end market side, newly emerging markets have increased in importance but the EU and the USA have remained dominant. Over the past 15 years global football manufacturing has faced concerns on labour standards compliance and experienced distinct patterns of product and process upgrading. Using the analytical frameworks of global value chains and technological capabilities and learning, this study considers the challenges arising from technological upgrading and labour standards compliance within the global football industry and its implications for local producers.

Keywords: global production networks; technological learning; clusters; sports goods; China; Pakistan; global value chains; GVCs.

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1 Introduction

One of the possible 'losers' of the 2010 Football World Cup staged in South Africa was the reputation of Adidas' 'Jabulani' match ball. Developed through a new design that

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involved the thermo-moulding of eight curved panels to produce the perfect sphere, the ball was supposed to be the most aerodynamic of its kind. It came in for criticism, however, from players, the media and football supporters for its often unpredictable flight[1]. The Jabulani match balls were manufactured for Adidas in China. Till the 1990s the World Cup match balls were hand-stitched and produced in Pakistan. These shifts, both in terms of the geographies of production and product and process upgrading, are two of the three key factors that have shaped the dynamics of the global football industry over the past 15 years. The third relates to compliance with international labour standards, most notably on child labour. Pakistan and China are the leading centres for production in an industry dominated by major global sports good brands. Using the analytical frameworks of global value chain (GVC) analysis and technological learning, this paper considers the challenges arising from technological upgrading and labour standards compliance in the global football industry and its consequence for local producers. The mechanisation of production and the economies of scale observed in China imply that Pakistani producers (and workers) need to improve their 'game' if they are to retain their global position in this industry.

The paper draws on primary evidence, including detailed qualitative firm interviews in Pakistan and China, as well as with the leading global sports goods brands, undertaken over a period of over two years between 2008 and 2010[2]. The paper is set out as follows. The next section outlines the analytical frameworks of GVC and technological capabilities and learning. Section 3 provides a descriptive overview of the global football sector and the geographies of production. It reviews changes in end markets and shifts in trade dynamics between the leading locations of football manufacturing in the world. Section 4 considers the nature of labour standard challenges. Section 5 outlines technological upgrading in both product and process activities. Section 6 considers the implications of technological upgrading and standards compliance for GVC linkages in China and Pakistan. Section 7 concludes by assessing the implications of these developments for Pakistani producers to improve their ability to compete with China.

2 GVCs and technological learning

One of the key developments in the recent literature on industrial organisation has been on the related concepts of GVC and global production networks (GPN) (Bair, 2005; Gereffi et al., 2005; Kaplinsky, 2005; Henderson et al., 2002; Coe et al., 2008)[3]. GVCs are described as an input-output framework that provide a detailed understanding of how goods and services are designed, produced, delivered, retailed and even recycled. The GVC framework provides a systemic basis to assess how value is created along the chain, and how it is expropriated. Central to the analysis is the role of 'lead' firms that organise the chain [what Rugman and D'Cruz (1997) refer to as 'flagship firms' in the business literature and Ernst (2002) describes as 'network flagships']. Gereffi (1994) initially distinguished between 'buyer' and 'producer' driven lead firms, the former being agents that undertook no production activity but had core competence in areas such as design, marketing and/or retail. The classic examples were the global shoe or garment sectors where the leading international brands and retail houses sourced products from dispersed independent suppliers. Producer driven chains were to be found in relatively more capital-intensive sectors, such as automobiles and electronics, where lead firms held core competence in production and design.

The buyer/producer distinction of lead firms has been questioned over time. In garments, for example, the emergence of 'fast fashion' has meant that some leading international brands (such as Inditex) engage directly in production while also sourcing from independent suppliers (Tokatli, 2008). In electronics, many leading global brands no longer engage in production and instead rely increasingly on first tier contract manufacturers (Sturgeon, 2002). Consequently in a seminal article Gereffi et al. (2005) argued that a more appropriate taxonomy of GVCs could be found by using transaction costs analysis. This distinguished the governance or organisation of GVCs according to the complexity of the transaction between lead firms and their suppliers, the capabilities of the suppliers, and the extent to which the transaction could be easily codified. This approach suggested distinct forms of governance relationships between lead firms and suppliers reflecting the distinct power asymmetries within the relationship. Thus, they argued, GVC relationships could take one of five governance forms, from market based transactions, to modular, captive, relational and finally hierarchical arrangements. Although the Gereffi et al. (2005) framework has been critiqued on the grounds that it is relatively static, and that in many sectors multiple forms of governance arrangements exist (Coe et al., 2008; Gibbon and Ponte, 2008), it remains a useful analytical tool in considering the nature and basis of power of lead firms within GVCs.

The nature of GVC governance can significantly impact on the ability of producers along the chain to upgrade. Humphrey and Schmitz (2002) distinguish the following forms of upgrading within a GVC context: process upgrading, product upgrading, functional upgrading, and chain upgrading. The ability of local producers within the chain to engage in these distinct forms of upgrading are, it is argued, conditioned by the ways in which such firms are inserted into the chain and the power asymmetry that marks their ties with the lead firm. Knowledge flows and the transfer of know-how and capabilities are seen to flow vertically through the chain, depending on the nature of governance ties. It is only in more modular forms of GVC governance, where power asymmetries are less sharp, where supplier capabilities are high and where the transactions are complex and ability to codify is also high that knowledge flows can also come from suppliers to lead firms, often through extensive user-producer based interactions and co-engagement. In contrast, in captive chains patterns of upgrading, learning and knowledge flows are likely to come from the lead firms and move down the chain to their dispersed suppliers.

One of the difficulties with the GVC framework is that while it provides an extremely useful analytical tool for understanding the dynamics of specific industries, it remains relatively weak in its conceptualisation of how technological progress, learning and capabilities are acquired. There is little understanding within the framework of the agency of individual firms in developing capabilities or the wider institutional context through which firms learn and technologically progress. This point has been noted recently by a number of scholars (Morrison et al., 2008; Sun and Zhang, 2009; Sato and Fujita, 2009). One critical aspect of this challenge is that the GVC framework is weak in terms of considering how learning takes place within firms, and how capabilities are acquired. There is of course a very rich and well understood literature on technological capabilities (Lall, 1992; Bell and Pavitt, 1993; Ernst and Kim, 2001) and on systems of innovation (Nelson, 1992; Edquist, 1999; Cook et al., 1997; Mytelka, 2000). This literature has provided insights on how capabilities are acquired within firms and across regions, and how innovative practices can systematically develop, and be socially embedded, within national and regional systems of innovation.

Understanding the capabilities of suppliers is central to considering how governance operates within a GVC. But capabilities are also dynamic and influenced by both intra-firm, intra-chain and extra-chain factors. As Morrison et al. (2008, p.41) have argued, in interrogating the relationship between technological capabilities and the GVC governance framework it is critical to first challenge the 'rather fuzzy' understanding of upgrading provided by the GVC literature. As they state, upgrading is fundamentally about enhancing capabilities, and this requires purposive action by firms. However, much of the GVC literature tends to confuse the causality between 'upgrading' and 'innovation', with the two concepts often being 'used interchangeably' (ibid, p.45). This criticism is not dissimilar to the challenge raised by Bell and Albu (1999) about the understanding of upgrading within much of the literature on clusters in developing countries. Moreover, the primary focus on the role of the lead firms and their governance structure as the key transmitters of knowledge, know-how and capabilities within GVCs tends to underplay the importance of the capabilities of suppliers along the GVC and their absorptive capacities to acquire and build on incremental and new knowledge. This implies a need for greater awareness of how learning takes place within suppliers, and also how suppliers within the chain move from what Bell and Albu (1999) refer to as 'knowledge using' to 'knowledge changing' capabilities. The former points to capabilities that enhance the capacity of firms to efficiently appropriate and use technologies, especially in process functions. The latter points to knowledge and capabilities that allow firms to innovate and develop the capacity to generate change.

While understanding the knowledge-using and knowledge-changing capability of suppliers requires more in-depth analysis of technical capabilities at the level of firms (and for that matter clusters and regions), capability enhancement is not solely an outcome of actions by the suppliers. The chain, and the nature of governance within the chain, also influences this process. In an earlier study, Nadvi and Halder (2005) described how insertion within the GVC impacted on the ability of local cluster producers in the Sialkot surgical instruments industry to acquire capabilities, especially capabilities related to process upgrading around compliance with quality assurance standards. However, knowledge-changing capabilities did not emerge through the GVC nor were they generated by local extra-GVC institutions or innovation and learning systems. Consequently, the Sialkot surgical instrument cluster had reached a technological plateau unable to acquire the skills and know-how necessary to bring about new product development and move into higher value added surgical instruments that required the capability to not only undertake metal working but also the capacity to use new materials (such as ceramics) and new technologies (including optical and fibre-optic processes). This inability to innovate was a direct outcome, according to Nadvi and Halder (2005), of the nature of GVC ties linking the cluster to global buyers and the failure of regional innovation systems to evolve.

In sum, the GVC approach provides a useful tool to understand how local producers are linked into global markets, and how lead firms can organise the complex chains that connect such producers. However, the GVC framework is relatively weak in its understanding of upgrading, and of how capabilities are acquired and learning takes place within the firm and along the chain. GVC governance is one critical factor in understanding this process, but it is also important to understand the agency of supplier firms in acquiring capabilities as well as the local systems of learning (or extra-chain knowledge milieus) within which firms in GVCs are also located. Finally, moving from knowledge-using to knowledge-changing capabilities may require learning from outside

the local knowledge milieu and the chain in order to develop new forms of tacit knowledge and capabilities. The challenge from Morrison et al. (2008) is therefore timely. However, they provide no empirical evidence of how technological capabilities, learning and GVC insertion and governance are linked.

3 The global football industry: an overview of the geographies of production

3.1 Trends in global markets and global trade

Football is now acknowledged as *the* global sport in terms of popularity. International trade in inflatable balls (of which footballs are the largest single component) is substantial, accounting for US$1.15 billion in 2008 (UN Comtrade, 2010), and trade volumes rose by 240% in nominal terms between 2001 and 2008 (ibid.)[4]. The growth in international trade in footballs is underlined by the marketing cache of international tournaments (most notably the football World Cup, the European Cup, and the Olympics), worldwide media coverage especially of the UK Premier League and the European Champions League, and the draw of the leading international football clubs and star players. Thus, football has acquired a cultural significance at the global level that cannot be matched by any other sport (Goldblatt, 2006).

At the same time the industry is increasingly dominated by leading international sports good brands. The main actors in the sector are Adidas, Nike, Puma, and Mitre-Pentland. Adidas and Nike are the key players. According to one web-based source, in 2009 Adidas accounted for 34% of the global football business with sales of US$1.57 billion from football related merchandising, while Nike has annual revenues of U$1.7 billion from footballs and football related products (http://www.sportskeeda.com/2010/06/11/adidas-vs-nike-the-biggest-world-cup-match/). Adidas and Nike compete extensively with each other in product development and in marketing, especially through commercial endorsements with major clubs, players and leading tournaments. The two leading brands have also consolidated their position in the industry by acquiring other major sports good brands. Thus, Adidas bought Reebok for US$3.8 billion in 2005 and Nike acquired Umbro for US$580 million in 2007 (Morris, 2007).

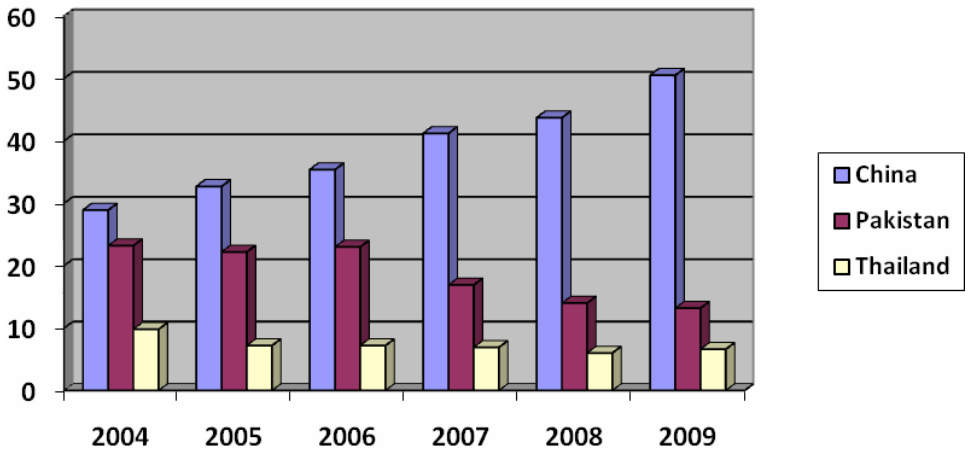
Footballs are differentiated by price, quality, performance and market niches. At the top end of the industry are professional match balls. These are developed and sold by the major brands and used in leading international and regional tournaments and by professional teams in the major domestic football leagues. Below match balls come training balls – which are somewhat lower in quality but still used by football professionals and leading teams. Training balls are also more widely available as retail items. Training balls are also manufactured for the leading brands through their supply chains, although unlike match balls there are a wider number of brands and distributors that source training balls. Within training balls there are a wide variety – differentiated by price and performance. The top end training balls are the branded replicas of match balls. At the lower end are non-branded and lower priced balls. Below training balls come a number of lower quality balls including recreational balls, promotional balls (sourced by non-sports brands as part of marketing strategies), laminated balls (that are not based on

PU or PVC panels and thus do not require any stitching) and finally toy balls (usually panel based and stitched but smaller in size than a normal football).

Prices vary sharply. Top end branded match balls retail at over US$130 per unit whereas branded replica recreational balls and lower end training balls can be sold for around US$15 to US$20 per unit. Non-branded PVC recreational balls can be sold for US$5 to US$10 per unit. While the major brands dominate the top end of the industry, they are not the sole marketing channels through which football producers engage with global markets. Manufacturers supply non-sports good brands (for promotional balls), football clubs and federations (for training balls), leading international retailers including the major global supermarkets such as Walmart, Tesco and Carrefour (for both training, recreational, laminated and toy balls) as well as a wide array of non-branded distributors and retailers who supply regional and lower end markets across the world (for both medium and lower quality footballs).

While the brands dominate the industry, they do not manufacture footballs. As in many other labour-intensive manufacturing sectors, the brands co-ordinate a large and widely dispersed group of global suppliers who act as original equipment manufacturers (OEM). The primary centres of production are China, Pakistan and Thailand. Together these three countries accounted for 70.3% of total global exports of inflatable balls in 2009 (UN Comtrade, 2010)[5]. However, as Figure 1 below indicates, there has been a dramatic shift in fortunes across the three locations in recent years. Pakistan has seen its market share fall sharply (from 23.2% in 2004 and 23.0% in 2006 to 13.2% in 2009), while China has experienced consistent growth (28.9% in 2004, 35.4% in 2006 and 50.5% in 2009). The third largest producer, Thailand, has also experienced a notable decline, from 9.8% of global exports in 2004 to 6.6% in 2009 (ibid.).

Figure 1 Share of global exports of inflatable balls from the major manufacturing countries, 2004–2009 (%) (see online version for colours)



Source: UN Comtrade (2010)

Pakistan's sharp decline in exports for 2009, a fall of 26% from 2008 export levels, may be a temporary glitch. Export trade in footballs peak in even years when the major international tournaments (the World Cup, the European Championships) take place.

These lead to added global demand for footballs, especially for recreational replicas of tournament match balls, and also a growth in demand for promotional balls used by non-sports goods brands as marketing tools at the time of leading international tournaments. Thus, both Pakistan and Thailand experienced higher export volumes in even years (with the exception of 2008 for Pakistan). These year-on-year increases can be substantial. Pakistan's export levels in 2004 were 64% higher than those in 2003, and similarly export volumes in 2006 (at the time of World Cup held in Germany) were 22% above those in 2005 (ibid.). Such large fluctuations clearly imply the need for flexibility on the part of local producers, to be able to quickly ramp up production for higher volumes in peak years. Interestingly, China has seen export volumes grow year on year and at a substantial pace until 2009. Annual growth rates in export volumes from China averaged a phenomenal 23% during the period 2003–2008, although growth rates were higher for even years, again underlining the biannual seasonality in global football demand.

What is clear is the consolidation of China as the leading manufacturer of footballs, at the expense of Pakistan. Pakistan's decline is especially marked since 2006. During the four year period 2006–2009, Pakistan's football export levels almost halved, falling from US$226 million in 2006 to US$118 million in 2009. During the same period Chinese exports of inflatable balls rose from US$348 million to US$454 million (ibid.). One factor that accounts for the rapid fall in football exports in Pakistan in 2007 was the fact that the leading buyer from Pakistan, Nike, stopped sourcing from Sialkot in late 2006 in response to compliance related allegations associated with possible leakages of production by their then main supplier in Sialkot to home-based units. Nike did return to the Sialkot cluster in 2007, sourcing, albeit in smaller volumes, from a new supplier. Yet, the fact that football export levels from Pakistan have not only not recovered to their peak of 2006, but declined each year between 2007 and 2009 suggests that there may be a more substantive erosion of competitiveness, and of markets, for Pakistani producers.

The nature of end markets has changed much less dramatically. The two leading global markets are the European Union (EU) and the USA. The EU is the largest single market, with 27.8% of total global inflatable ball imports in 2009, while the USA accounted for 19.8% of total global imports. While the EU's import share has remained relatively consistent, that of the USA has declined (from 23.6% in 2004). On the other hand, newly emerging markets (particularly in Latin America but also in East and South East Asia) have grown although they command a much smaller share of the global imports of football (ibid.). The increasing importance of new end markets reflects the growing global popularity of the sport, and the expansion of sports goods retailing and the major sports goods brands into newly emerging markets. Thus, the main players in these 'new' markets are often the traditional global brands based in developed countries. For example, Nike considers China not only its major sports goods supplier but also its leading end market (Nike interviews, Boston, January 2008; Guangzhou May 2010).

While both China and Pakistan supply all the major sports goods brands and non-sports brands as well as leading global retailers alongside a myriad of independent distributors, their end markets differ quite sharply. China's main market has consistently been the USA. Pakistan's main market has remained the EU, accounting for approximately half of Pakistan's total exports of footballs during the period 2004–2009 (see Table 1).

Table 1 Leading markets for Chinese and Pakistan inflatable ball exports, 2004–2009

Main markets	*2004*		*2006*		*2009*	
	China	*Pakistan*	*China*	*Pakistan*	*China*	*Pakistan*
1st	USA 45.9%	EU 48.0%	USA 36.7%	EU 49.8%	USA 27.9%	EU 51.5%
2nd	EU 19.2%	USA 11.4%	EU 22.1%	USA 11.1%	EU 19.4%	USA 9.7%
3rd	Japan 4.2%	Mexico 6.4%	Japan 4.0%	Mexico 8.8%	Japan 3.4%	UAE 5.7%
4th	South Korea 2.3%	UAE 4.5%	South Korea 3.0%	UAE 5.3%	Kazakhstan 2.6%	Mexico 4.0%
5th	UAE 2.2%	Japan 3.1%	Chile 2.2%	Japan 2.4%	Russia 2.3%	South Africa 3.0%
6th	Chile 1.7%	Chile 2.4%	UAE 2.2%	Turkey 2.1%	Saudi Arabia 2.2%	Turkey 2.8%

Source: UN Comtrade (2010)

Moreover, there is an interesting story with regards to emerging markets. China has seen its export markets diversify in recent years, with the US accounting for 27.9% of total exports in 2009 as compared with 45.9% in 2004. New emerging markets for China include countries such as Chile, Brazil, Russia, South Korea and the Arab Gulf states. Brazil, for example, accounted for 0.3% of total Chinese inflatable ball exports in 2004, 0.7% in 2006 and 2.1% in 2009 (UN Comtrade, 2010). Pakistan, too has diverse end markets for its footballs, with key emerging markets in Mexico, United Arab Emirates, Turkey and South Africa. The importance of these emerging markets as a whole is borne out in Table 2. Amongst the top ten exports markets for both China and Pakistan during this period, the share of exports to emerging markets has clearly and consistently grown for both countries. Moreover, as a whole these emerging markets count for a significant overall share of total exports, outstripping exports to the USA from Pakistan.

Table 2 China and Pakistan's inflatable ball exports to emerging markets, 2004–2009

Share of total exports to emerging markets (for top ten export markets only)	*China*	*Pakistan*
2004	8.4%	19.3%
2006	10.9%	20.1%
2009	15.1%	21.8%

Note: Emerging markets are defined as non-OECD economies but includes Chile, Mexico and South Korea which are OECD member states.

Source: UN Comtrade (2010)

These distinct patterns of exports from China and Pakistan reflect in part the different kinds of footballs that the two countries produce. While both manufacture across the full range of footballs outlined above, Pakistan has historically been known as the leading producer of high quality hand-stitched match balls, although it also produces lower quality hand stitched training, recreational, promotional and toy balls. China on

the other hand primarily produces lower to medium quality machine-stitched training, recreational, promotional and toy balls as well as laminated footballs. This is the volume end of the global industry and China's rapid expansion as the leading football producer is associated with the higher productivity levels and improving quality of machine stitched footballs. Moreover, process and product upgrading has also meant that China is now the main supplier of the highest quality top end professional match balls produced for the two major global brands, Adidas and Nike. Thus, it has encroached into Pakistan's niche in the high end professional match ball market.

3.2 Football production in China and Pakistan

According to one estimate there are some 200 football manufacturing suppliers in China (Global Sources, 2006). These are primarily located in two areas. First, in Guangdong province where large foreign owned (primarily Taiwanese and Hong Kong) factories produce a wide range of sports goods. Second, in Jiangsu province where there are a number of smaller producers that focus primarily on footballs and other inflatable balls. Within Jiangsu there are specific clusters of football producers, especially in Wuxi, Nanjing and Haimen. Moreover, the vast majority of football manufacturing units in Jiangsu are not FDI-based factories. Most have grown out of former town and village enterprises (TVEs), state owned enterprises and small private family workshops. Both regions produce machine-stitched footballs. However, China's relatively smaller production of hand stitched balls comes largely from Jiangsu province, in particular from small and medium sized factories in the Haimen region.

There is also a marked difference in terms of factory size as well as production scope between the two regions in China. Many of the factories in Guangdong employ over 1,000 workers and usually produce a wide range of sports goods and equipment. Some of the largest firms (the biggest football manufacturing firm in China employs over 7,000 workers) are highly specialised in a range of balls and produce for the major global brands, in some cases maintaining separate production lines for both Nike and Adidas. In contrast, the Jiangsu based firms are considerably smaller (with a workforce of between 100 to 300 workers), only produce balls, and often act as suppliers to traders or in some cases as second-tier suppliers to major brands. Finally, as effective wages and labour turnover have begun to rise in recent years in the Pearl River delta, some large foreign owned plants have moved from Guangdong to new 'Greenfield' sites in inner provinces (such as Jiangxi) where wage rates are lower and regional fiscal incentives to attract new investment significant.

Compared with the relatively dispersed pattern of production observed in China, football manufacturing in Pakistan is found solely in and around the city of Sialkot in Northeastern Punjab. Here, a cluster of nearly 400 small and medium-sized manufacturing units employ approximately 30,000 workers in total (Nadvi, 2004; UNIDO, 2008). The cluster has a long history that dates back to the colonial era. Within the cluster a group of some 30 medium to large firms dominate. However, Pakistan's large firms are much smaller compared to those in China, with only a handful of firms in Sialkot directly employing more than 500 workers. Production is undertaken within the confines of the city of Sialkot, although football stitching can be found in rural villages within a 50 kilometres radius of Sialkot.

There is also a sharp distinction in the nature of the production process across China and Pakistan. Chinese footballs are primarily produced in large factories with mechanised

production lines using machine stitching technology. The PU and PVC based panels are usually made in-house and panels subsequently cut and printed. The panels are then stitched by machine and bladders and valves inserted before the final balls are tested and packed. In Guangdong in particular there is a preponderance of migrant workers who live within factory based dormitories, and wage levels are influenced by the local legal minimum wage regulations. In Pakistani football factories panel cutting and printing is undertaken in-house and is partially mechanised. Stitching, however, is wholly undertaken manually. Moreover stitching is rarely carried out within the confines of the factory – instead it is usually put out through subcontractors to specific stitching units where individual stitchers stitch balls on a piece rated basis. Stitched balls are then returned to factories for quality assurance, final assembly and packaging.

Productivity levels differ sharply between China and Pakistan, reflecting the distinct technological forms that dominate the two locations. Factory based machine stitchers in China produce around 40 footballs a day (usually working a 10-hour shift for six days a week). In contrast, full-time hand stitchers in Pakistan stitch between four to five balls a day (again working six days a week for an 8-hour shift per day). Sialkot's football stitchers, unlike their Chinese counterparts, are not migrant workers. They come from Sialkot and its rural hinterland. For many of Sialkot's stitchers, football stitching was seen as an off-farm activity to augment other sources of rural livelihoods. Stitchers working for the larger manufacturers in Sialkot have now graduated into full-time employment. In Sialkot, stitching is carried out by men and women, although men tend to get to work on the higher quality match balls as these are made with thicker PU panels and thus require more force and strength to carry out the hand stitching of panels. Consequently, male stitchers tend to get a higher piece rate wage. Most Pakistani stitchers have very low levels of education (and many are illiterate) and average earnings from football stitching rarely exceed US$3.00 a day in Sialkot. Wage levels in football factories in China were considerably higher than those reported in Pakistan, at around US$10 to US$12 a day for factories in Guandong province and around US$7 a day in the Jiangsu region[6].

4 Labour standard challenges

A key factor in recent developments within the global football manufacturing industry has been the pressures associated with labour standards compliance. Given the global cultural standing of football, and the role of major global brands in the industry, meeting international labour standards is of great significance. This has been most sharply and most widely felt in relation to the use of child labour in football stitching in Pakistan[7]. In 1995 and 1996 a series of media exposes revealed the presence of child workers in Sialkot, especially where work was being undertaken in home-based units. A very rapid response ensued, driven both by local producers through their trade body the Sialkot Chamber of Commerce and Industry (SCCI), and by the leading brands through the World Federation of Sporting Goods Industry (WFSGI). In 1997, the Atlanta Agreement was signed which provided a mechanism to ensure credible monitoring against child labour by the International Labour Organization (ILO) and the implementation of a number of social protection initiatives geared to tackle the root causes of child work – poverty, low incomes and poor education provisioning within the region. Funding for these initiatives came from a range of international donors, including the USA (which

co-funded with the local industry the ILO's monitoring programme) and the UK (which financed international NGO efforts on education improvements). The major brands required their suppliers to subscribe to the monitoring programme and by 2003 some 90 local manufacturers (and all the leading OEM suppliers to the leading global brands) were being monitored by the ILO inspectors (Nadvi, 2004, Lund-Thomsen and Nadvi, 2010).

The challenge of child labour in Sialkot resulted in a significant shift in production arrangements. While stitching continued to remain a manual task paid on a piece rated basis, production moved into designated stitching centres which could be more easily monitored both by the ILO and by the major brands. These centres were independent sub-contractors to the OEM suppliers. In 2003–2004 external funding for child labour monitoring and social provisioning ended and these functions were taken over by local actors. The leading international actors (the ILO, UNICEF and the UK's Save the Children Fund) left the cluster with their tasks taken over by local public and private bodies and funded primarily by local producers. In 2006, the largest buyer from the Sialkot cluster – Nike – stopped sourcing from its sole supplier (and at the time the largest producer in Sialkot) on the grounds of alleged leakages of production from the designated stitching centres. Nike returned to the cluster a year later sourcing from a new supplier but with one major difference from its previous arrangement. The fear of further potential leakages led Nike to demand that its new supplier would not use subcontractors for stitching, and that all production (including all stitching work) had to be undertaken within the supplier's factory premises. Factory-based production also implied for Nike a move towards the use of permanent wage employees who were to be provided the full legal provisions under Pakistani labour laws (Lund-Thomsen and Nadvi, 2010).

Although child labour has not been an issue in football production in China, labour standards challenges, while not as acute as those faced in Pakistan, have been relevant to the Chinese football manufacturing sector. These have related to issues of working conditions in football factories as well as overtime and the limits to collective bargaining rights. In addition, workers in football manufacturing in the Guangdong region are predominantly migrant workers who usually live in dormitories within the factory premises and as migrant workers do not have local '*hukou*' (or citizenship) rights which limit their ability to access healthcare and other social provisioning. These issues are not dissimilar to those faced in other labour-intensive manufacturing industries in the Pearl River Delta (Chan, 2003, 2010; Pun, 2005; Sum and Ngai, 2005). There is also evidence of labour strife within the football manufacturing sector. The major brands have sought to address these concerns by requiring their suppliers to strictly comply with the brands' individual codes of conduct and corporate social responsibility norms.

In addition, there have been questions on the use of prison labour in Chinese football production. While prison labour is not illegal in China, US law restricts the import of goods manufactured by prison labour. During the late 1990s questions were raised about the possible use of Chinese prison labour in the football manufacturing supply chains of leading brands (see http://news.bbc.co.uk/1/hi/124522.stm). Subcontracting of football production by the main OEM suppliers in China to smaller units, especially in response to peak demand, is not uncommon. This raises concerns on the possibility of leakage of production to prisons, and to home-based units where underage labour may be present where such subcontracting practices are not properly audited (Fair Labour Association, 2010). One consequence of the challenge raised by the possibility of leakage of production to prison workers has been a greater concern by the brands to have more

independent and in-house monitoring of their supply chains and to move increasingly to sourcing from suppliers that have the capacity to undertake all production in-house.

5 Upgrading and new product and process technologies

Research on the global football industry, and in particular on the Sialkot cluster, has tended to focus almost wholly on the child labour issue and the consequent implementation of the Atlanta agreement (Husselbee, 2000; Kolk and Tulder, 2001; Nadvi, 2004, 2008; Khan, 2007; Khan et al., 2007; Seigmann, 2008; Lund-Thomsen and Nadvi, 2010; Lund-Thomsen and Khan, 2011). What has not been studied at any length is the nature of technological change within the industry, and its consequences for, *inter alia*, the geography of production.

It is worth reflecting briefly on the developments in football product and process technologies. The modern football was historically made of leather and manufactured by hand in the UK and in parts of Europe. The main technical concerns in football production related to improving the spherical nature of the ball and to reduce its ability to absorb water. This led over time in two key innovations. First the development of the 32 panel ball (consisting of 20 hexagonal and 12 pentagonal panels) in the early 1960s by the Danish company Select Sports, which resulted in a more realistic sphere. Second the gradual replacement of leather by less porous synthetic materials in the manufacturing of panels during the 1960s through to the mid 1980s. It was not, however, until 1986 that the first fully synthetic polyurethane (PU) football was produced for the 1986 World Cup tournament in Mexico. The vast majority of match, training, recreational and promotional footballs manufactured today are made solely from synthetic leather substitutes and the 32 panel ball remains the most common.

During the past decade a key area for technological improvement in footballs has been associated with advances in the materials used in making ball panels – from higher quality woven and non-woven PU, to improved poly vinyl chloride (PVC) and thermoplastic polyurethane (TPU). Within each of these materials there are differing qualities, often linked to the kinds of fabric, foam, rubber and backing materials used in the construction of panels. PU has tended to be the best material in terms of ball construction – being resilient, highly water resistant and providing the best performance and aerodynamic qualities. PVC has been a cheaper material and one that is often linked with negative environmental externalities. However, PVC is one of the most common materials used to produce footballs and an area where material development has improved. TPU is emerging as an important material that is beginning to replace PVC especially with the mass market segment of training and recreational balls.

While improved materials impact on the aerodynamic qualities of footballs, and reduce their absorption of water as well as lower costs, product development has also focused on the construction of the perfect sphere. Over the past five years this has seen the emergence of footballs manufactured with fewer interlocking panels. In 2006 Adidas introduced the first 14 panel thermo-moulded football for the 2006 World Cup in Germany (called the Teamgeist ball). The reduction in panels meant that the new ball more clearly formed a perfect sphere, with less resistance and thus offering improved flight and performance. The nature of the panels used also provided more opportunities for top players to spin the football, thus improving their ability to curve the ball in flight making it more difficult for goalkeepers to predict directions. With the traditional

32 panel ball there is the possibility for greater air friction arising from the points and threading that stitch the panels together. The 2006 thermo-moulded ball reduced this by reducing the number of panels and by doing away with the need for stitching the panels through the use of thermo-moulding technologies that bonded the panels together under high temperatures. The 2010 Adidas Jabalani ball took this process further by reducing the number of panels (from 14 to 8) and by making the panels themselves curved rather than the traditional flat panels. Thus the Jabalani ball was considered by Adidas to further improve the aerodynamics, flight and performance qualities of its 2006 teamgeist ball.

It is clear, therefore, that product development upgrading in the football sector is closely related to process development upgrading. There are a number of aspects to this. First, the traditional 32 panel football used to be stitched by hand. In 1996, the Taiwanese owned firm Top Ball, based in Dongguan, China, patented the use of machine stitching technologies to manufacture footballs using glue-coated nylon thread. This development radically transformed production and was copied widely within China by other manufacturers. This process innovation was critical to the rapid growth of the export football manufacturing sector in China.

For the premium match balls, hand stitching was still considered to be of higher quality due to the improved tension of the stitch compared with what could be achieved through machine stitching. Thus at the top end, hand-stitched balls were considered more reliable and more aerodynamic then machine-stitched balls. Consequently, one of the key features of Sialkot has been the wholly non-mechanised process of neo-artisanal hand-stitching. In fact, it is the quality of hand stitching to be found within Sialkot that has allowed the cluster to continue to be a key supplier of the premium segment of the match and training ball market, and to ensure that the leading global brands continue to source from there. At the same time, as the trade data underlines, export production has grown sharply in China where machine stitching undertaken along factory-based assembly lines is the dominant form of production. Machine-stitched balls do not have the same resilience and qualities as premium hand stitched products, but that appears to be changing as machine stitching process technologies improve.

Second, the emergence of thermo-moulded balls in recent years has shown that high quality machine-made footballs can compete in terms of shape, quality, aerodynamics and performance with the high-end hand-stitched balls. Thermo-moulded balls were initially produced under patent by Adidas's supplier Molten in Thailand. More recently Adidas developed the newly patented Jabulani ball with a new first tier supplier in China. Following Adidas, Nike has developed its own variant of thermo-moulded footballs. In terms of process technology know-how, the key feature of thermo-moulded football production is that it requires capability and know-how related to injection moulding techniques and is thus quite different as a production line from a traditional machine-stitching assembly line. Thus, it is interesting to note that when Adidas shifted its sourcing of thermo-moulded footballs from Molten in Thailand to a new supplier in Shenzhen, China it turned to a firm that had not previously manufactured footballs, but was a long term first tier supplier to Adidas of goal keeper gloves and shin guards using injection moulding technologies.

Third, the leading brands, in particular Nike but also Adidas, have promoted the adoption of lean manufacturing principles by their football manufacturing suppliers. The adoption of lean manufacturing in football production began in 2009 when Nike reformed its internal organisational structure to integrate its compliance-related functions with its sourcing practices. This led to the view that the adoption of lean manufacturing could

result in process efficiency for producers through the reduction of waste and the adoption of just-in-time practices, as well as improve outcomes for workers with enhanced productivity and higher wages. Locke and Romis (2007) illustrate the adoption of lean manufacturing practices by Nike in its ties with apparel suppliers in Mexico. As one of our key informants in Nike stated:

> "lean philosophy and lean principles are now driving the logic of all sourcing strategies [in Nike]. If the worker can be empowered – to stop the production lines – then they are more likely to be able to report abuse as well as ensure that the issues of compliance failure do not arise. This also enhances value – and creates value." (Nike interview, Guangzhou, May 2010)

Interviews with Adidas also suggested that lean production was a key factor in process organisation within the supply chain. As one Adidas key informant reported:

> "We are definitely moving towards lean production as a way to enhance efficiency. Lean manufacturing is reducing waste, reducing inventories, reducing manufacturing time and reducing 'ways', people in the lines have to have as short as possible movements." (Adidas Interview, Guangzhou, May 2010)

While the shift to lean production for Nike appeared to be linked to improving, and internalising, compliance more centrally into its sourcing practices, we were able to observe changes in the organisation of production by first tier suppliers for both brands. Thus, for example, Adidas' main supplier in China reported that its main production line operated on lean principles. Rather than assembly line manufacturing, there were cell-based production teams that included panel stitchers who worked alongside workers producing the final bladder, threading the bladder, and the screen printing of panels. Individual workers appeared to be doing two to four tasks within each given process with inputs provided every few minutes. This shift to lean manufacturing took over two years for the supplier to implement and led to cost savings in costs through reduced inventories and waste. The supplier acknowledged that Adidas played a key role in this transition, in providing know-how and support. At the same time they faced substantial resistance from workers who were not keen to move to group-based units and incentive systems (supplier interview, Jiangxi Province, May 2010).

6 Upgrading, learning and GVC ties in the global football manufacturing industry

The football sector has seen some significant patterns of upgrading in terms of new products and process technologies over the past 15 years. The use of new materials has enhanced the performance of footballs, while changes to the structure of the ball, and the ways in which it is assembled have also transformed the industry itself. The sources of knowledge behind these changes have been mixed. This section explores the relationship between GVC governance and patterns of learning and capability acquisition. As discussed earlier, one of the limitations of the GVC approach is its relatively weaker understanding of the processes by which upgrading comes about (Morrison et al., 2008). Understanding upgrading requires an analysis of not only intra-chain relationships, but also intra-firm and extra-chain ties.

In an industry where the brands are so dominant, the leading brands have been an important source for knowledge-changing innovations. The development of the non-stitched high performance thermo-moulded ball with fewer panels, emerged, for example, from the research and development efforts of Adidas. However, the development of the process technologies to mass produce the thermo-moulded product required close interaction between Adidas and its first tier suppliers, initially Molten in Thailand and subsequently Long Way in Shenzhen, China. Similarly, other brands have also actively engaged in new product development, especially in the use of new PU and TPU materials that have improved ball performance. And more recently, the brands have been the leading motivators that have encouraged suppliers to adopt lean management principles in their production organisation. However, to successfully implement these changes has also meant interacting with suppliers that have capabilities and engage in what Lall (1992) referred to as 'technical effort'.

Thus, in the development of the new thermo-moulding techniques to produce the high bonded footballs, both Adidas and Nike have developed ties with key suppliers in China that are organised around modular and relational forms of GVC governance. For this supplier capability is critical. In the context of thermo-moulding, the key suppliers have to have access to capabilities in new process technologies associated with working with resins, with injection moulding and with heat treatments that were not found in traditional machine stitched football factories. In the case of Adidas this has meant building links with a key supplier that did not traditionally manufacture footballs but had the necessary capabilities for developing process techniques in thermo-moulding.

At particular moments, in certain areas of process upgrading it has been the suppliers and not the brands that have driven the change. The development of mechanised stitching, for example, came about through the technological efforts of the Taiwanese owned firm Top Ball which in 1997 pioneered the know-how and the capabilities to machine-stitch the 32 panel ball, and to build effective machine stitching assembly lines in its Dongguan factory. This was a radical transformation that revolutionised the football sector in China and allowed China to substantially increase its global market share. The rapid spread of know-how and capabilities around machine stitching came about as many workers and managers from Top Ball moved to other factories, or 'graduated' into setting up their own units. Adidas only began sourcing machine stitched balls for the first time from Top Ball in 1998. Top Ball, which has now largely relocated within China and established Smart Ball, is Adidas' main global football supplier. The nature of GVC ties between Top Ball/Smart Ball and Adidas are clearly relational. Adidas, for example, encouraged and assisted Smart Ball in adopting lean management practices in production.

These patterns of technological change have been critical to enhancing China's position within the industry. Interestingly, interviews with key respondents and producers indicated that there were no forms of extra-chain relationships that drove the process of technological learning and the acquisition of capabilities in China. There were no links to technology institutes or to external public sector research and development agencies. Thus there appears to be no specific regional or national innovation system that motivated, or promoted, the process of upgrading and capability development in the Chinese football manufacturing sector.

Yet, the nature of the chain itself has begun to alter. One of the key points raised by all the brands interviewed was the extent to which they had begun to consolidate their supply chains. Adidas, for example, now uses only two football suppliers in China. One

firm to produce all its requirements for machine stitched balls and another for its thermo-moulded footballs. Similarly it uses two suppliers in Sialkot to provide its demand for hand stitched balls. The rationale for this was clearly stated by our Adidas respondent as follows:

> "Shrinking the supply base also has to do with relationship, trust, costing, quality – all these parameters are important. It is better to have a consolidated supply base. You know the supplier for a long time, you know their capability to innovate, to have quality etc. This is good for us and for them." (Adidas Interview, Guangzhou, 11 May 2010)

Nike has done the same. It has one main supplier for hand-stitched balls from Sialkot and four suppliers from China. Of the four Chinese based firms, one is also Adidas's main supplier. Each of the four firms have distinct product lines for Nike – from machine stitched, hand stitched, laminated and its new hybrid thermo-moulded balls. As with Adidas, Nike has one preferred 'technology innovation partner'. This firm not only produces the Nike's top end hand stitched footballs (which it formerly used to source from Sialkot), but also works with Nike in developing its own hybrid thermo-moulded product.

The consolidation of the supply base also implies lower governance costs in terms of managing the chain, especially on issues of compliance. All the core suppliers are firms with which the brands have developed long standing relationships and have a good assessment of their capabilities and practices. Moreover, as the supply base narrows, the capacity of the supplier becomes critical. It is not surprising therefore, that Adidas's main supplier for machine-stitched balls is the largest single football manufacturing factory in the world, employing 7,200 workers and producing 3 million inflated balls a month of which nearly two million are footballs (supplier interview, Jiangxi, May 2010). Similarly, Adidas' main supplier of hand stitched balls in Sialkot has a production capacity of 500,000 balls a month and employs 1,200 workers within its main factory as well as a further 4 to 5,000 workers, who work for independent contractors in the supplier's 75 dedicated stitching centres in and around Sialkot. It claims to be the largest hand-stitching football manufacturer in the world (supplier interview, Sialkot, March 2008).

Product and associated process upgrading in footballs, in terms of the moves towards machine stitching and thermo-moulding, is primarily observed in China. As a consequence, for the leading brands, the nature of GVC ties have begun to change in their sourcing arrangements from China. Rather than simply captive relationships, these ties are marked by relational as well as modular arrangements that recognise the capabilities of suppliers, and thus their importance to the brands. But this raises two questions, first, what are the implications for learning, upgrading and GVC governance in Pakistan? Second, what about other buyers, to what extent do they display similar practices in terms of GVC governance and learning processes as seen with Adidas and Nike?

In the context of Pakistan we see little evidence of product or process upgrading within the Sialkot football cluster. The dominant form of production remains hand-stitching. This continues in the main to be done by independent sub-contractors who work for specific football manufacturers. The only exception to this is Nike's main supplier which, on the insistence of Nike, has adopted a factory based model of production organisation with all production related activities undertaken within the

factory premises. The primary motivation for this is the continuing concerns related to labour standards compliance, and the need for the major brands to minimise costs associated with damaging allegations on non-compliance on labour standards.

There was at the time when this research was undertaken, little evidence of Pakistani producers acquiring machine stitching technologies or developing thermo-moulding techniques[8]. This would require new forms of capabilities and skills which are currently not to be found within the cluster. Similarly, local cluster-based institutions providing technical support, know-how, skills or research and development inputs to the Sialkot football manufacturing cluster are extremely limited. Hence, GVC ties in Sialkot remain largely captive in nature with power resting in the hands of the major brands and buyers. The ties remain captive because of the on-going concerns around compliance, although for some of the major brands (Adidas for example) ties with key suppliers may be moving into more relational arrangements. Learning and knowledge acquisition will probably require greater engagement between the suppliers and the brands. It would also require suppliers investing in enhancing their own capabilities, and raising human capital as well as investing in new process technologies.

With respect to the second question, there are a number of other buyers in the football sector who do not operate in similar ways to the leading global sports goods brands. These include non-sports brands that demand promotional balls, major global retailers as well as a wide array of traders, wholesalers, distributors and football clubs. For such buyers close ties with suppliers is less critical. These buyers are not sourcing the top end match balls, but instead more standardised and relatively lower quality products. For this they do not need modular or even relational forms of chain governance. In some cases, governance arrangements are defined by market-relationships with short-term ties with suppliers. What is often more important is the need for suppliers to meet economies of scope – that is to say to supply not just footballs but also a wider range of related sports goods. Thus, many of the football firms interviewed in Guangdong province were noted for their ability to produce a range of inflatable balls as well as non-ball sports products and accessories. Such firms, however, rarely dealt with the leading global sports goods brands. Again, this places a pressure on the Sialkot cluster. Its product line is almost exclusively in footballs, and there is limited evidence of scope economies to be observed in the cluster.

7 Conclusions: labour standards, technological upgrading and the shifting geographies of production

The global football industry is noteworthy for a number of reasons. It has grown rapidly over the past decade. It has also seen a significant shift in terms of the locations of production and the emergence of new end markets. China has consolidated its position as the world's largest football manufacturer, taking market share from Pakistan the world's second biggest producer. In China production is largely concentrated in two regions, marked by quite different types of firms and products. Supplier consolidation by the leading brands has also meant the growing significance of large OEM producers in China. In Pakistan production is solely located in one cluster that supplies both the leading brands as well as diverse end markets. The global football industry is dominated by well known international sports goods brands. These too have consolidated their

positions with Nike and Adidas the dominant players. The football manufacturing sector has drawn a great deal of attention in recent years from both the media and academics for challenges related to labour standards, in particular child labour. At the same time, there have been important areas of technological upgrading within the sector, in terms of product development (new types of more aerodynamic footballs) as well as the use of new process technologies (from machine stitching to thermo-moulding).

The GVC framework provides a useful tool to map the global industry and to assess how the chains are governed and organised by the major brands. But the framework is relatively weak in terms of providing a handle on how technological upgrading takes place within the sector. For that a better understanding of firm level capabilities and learning processes is required. As the paper has shown, the changing patterns of GVC governance exercised by the leading brands in their sourcing arrangements from OEM suppliers in China and Pakistan take account of the growing importance of supplier capabilities, and the role of some key first-tier suppliers as critical technological and innovation partners.

The sector has also been marked by challenges in terms of social compliance. These challenges have been met in part by more stringent monitoring of the chain, through codes of conduct and internal and independent audits as well as through cluster based monitoring on child labour undertaken in Sialkot by independent international, and now local, agencies. Pressures on social compliance have altered the nature of production in Pakistan, with the leading brands no longer willing to source from suppliers who sub-contract aspects of production to home-based locations. Thus, in the Sialkot cluster one can observe the rise of increasingly more regulated forms of labour organisation, in designated stitching centres as well as in integrated large factories. Although not as acute a pressure as that faced by Pakistani producers, labour standards compliance has been an issue in China as well, and this is one factor behind the greater consolidation of first tier suppliers in China by the leading brands.

A number of authors have recently argued for greater attention to be paid to the links between economic and social upgrading within GVC ties (see, for example, Locke et al., 2009; Barrientos et al., 2010; Milberg and Winkler, 2010; Mayer and Pickles, 2010). Some of this new research has sought to understand whether engagement in GVC and GPN have led not only to higher levels of productivity and employment growth, but also whether and how this has improved outcomes for workers, especially in terms of wages, working conditions and, more broadly, labour rights. This raises important academic and policy questions for the global football manufacturing industry. What consequences arise for local producers and workers from the twin challenges on labour standards compliance and technological upgrading? In particular, what are the implications of this for the Pakistani football manufacturing industry as it confronts the growing competitiveness of China? This calls for further research.

The Pakistani football industry has managed to confront the substantial challenge it faced on child labour during the mid 1990s. This required both local joint action within the cluster as well as international interventions by the global brands, NGOs and by international agencies. While the Nike pull-out of 2006 underlines the continuing vulnerability for the Sialkot cluster to challenges on social compliance, there is evidence to suggest that within the cluster larger producers and key suppliers to the major brands have managed to retain their positions, and even grow. It is less clear as to the outcomes for workers, especially poorer and more marginalised segments of the

football manufacturing workforce. The conclusion that emerges is that social compliance is a necessary but insufficient condition to compete in the global football industry and supply the major global brands. That requires technological as well as social upgrading.

It is apparent that in terms of the technological upgrading within the global football sector, Sialkot has seen little evidence of new product development or shifts from hand stitching to mechanised forms of production. This has implications for the local industry and its ability to retain its global position. Sialkot continues to hold a niche for high quality premium hand stitched production, but at the same time improvements in machine stitching in China, the developments in more aerodynamic thermo-moulded footballs produced in China and the presence of high quality hand stitching has meant that Sialkot's market niche is being eroded. To respond to this the cluster needs to upgrade. This requires technological effort at the level of individual firms and for the cluster as a whole. This will not be easy.

The Sialkot cluster and the firms within it have to develop capabilities in a number of areas. First, they need to acquire improved capabilities in materials, especially in terms of the high end PU and TPU products that are being developed to improve the dynamics of footballs. Second, they need to acquire new capabilities in the realm of process technologies and production organisation. This implies developing the capabilities to undertake machine-based stitching. Acquiring such capabilities not only requires the acquisition of new technologies but also the development of new, and relatively alien, skills and ways of working for the cluster. For example, most of the Sialkot cluster's hand stitchers are poorly educated and often illiterate, and work from a crouching position close to the ground. Machine stitching implies working on seated work benches along mechanised production lines. This means not only new technology but also new forms of tacit knowledge and some degree of literacy and numeracy skills. This calls for extensive (re-)training of workers in Sialkot. Meeting the challenge on human capital is even more critical if the cluster is to regain its quality niche and manufacture thermo-moulded footballs. That requires an understanding of injection-moulding technologies, the use of resins and also heat processes within manufacturing. It is unlikely that this technology can be simply bought of the shelves. For it to be effectively developed and implemented within the Pakistani context new aspects of firm and worker level capabilities need to be developed within the cluster. This requires external extra-chain interventions, especially through local cluster-based institutions, as well as closer relationships within the GVC for effective learning to take place. In particular it calls for strategic and targeted policy support on technological upgrading and learning.

Finally, further research is needed to better understand the outcomes of these developments in social compliance and technological upgrading for workers both in Pakistan and China. What groups of workers have benefited from the changes brought about by product and process upgrading in the two countries, and how? How do working conditions and workers' benefits differ across the two countries, and distinct segments of the football sector? What consequences do the dynamic trends in global trade in footballs imply for football manufacturing workers in China and Pakistan? These questions call for more detailed and in-depth research that explores workers' experiences and draws on evidence from the workers' perspective.

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Notes

1 See for example, http://news.bbc.co.uk/sport1/hi/football/world_cup_2010/8743207.stm.

2 A total of 17 manufacturing firms were interviewed in China and 11 producers in Pakistan. In addition interviews were carried out with key respondents in the major brands including Nike, Adidas and Mitre-Pentland.

3 While the critical distinctions between the two concepts are noted, for the purposes of this paper which concentrates on vertical inter-firm relationships, the GVC framework will be used.

4 The UN Comtrade database reports trade figures for inflatable balls (product code 950662). This includes all types of inflatable balls including volleyballs, basketballs, rugby balls as well as footballs.

5 This data includes all types of inflatable balls. Pakistan only produces footballs whereas China manufactures the full variety of inflatable balls (basketballs, volleyballs, rugby balls as well as footballs). Hence, within the sub-category of footballs Pakistan's share is somewhat greater than the figures reported here for inflatable balls would suggest.

6 This data comes from interviews conducted with manufacturers.

7 Child labour has also been a challenge for the Indian football industry clustered in and around the city of Jalandhar in the Indian Punjab. See Lund-Thomsen and Nadvi (2010) for a detailed comparative discussion of the pressures on child labour in football production in South Asia. This paper does not address the Indian case on the basis that India remains a minor player in global football manufacturing, accounting for only 2% of world football exports.

8 There is some indication that Adidas' main supplier in Sialkot has acquired thermo-moulding technologies and is developing, with Adidas, supply of thermo-moulded balls, see http://online.wsj.com/article/SB10001424052748703465204575207982953211828.html.