

Part IV

Plugging into supply chains:
designing policy for a
changing world

11 Policies to improve the supply chain: what needs to be done?¹

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11.1. Introduction

As the agenda of trade facilitation achieves more prominence on the international stage, the prioritization of interventions takes on increasing importance. Discussions of trade facilitation often take in anything that might promote trade other than tariff reduction. In its broadest sense, trade facilitation can include both eliminating non-tariff measures (NTMs), often defined as policies other than tariffs that impede trade (compare UNCTAD, 2010), reforms to customs and border measures, improvements in transformation and communications infrastructure, regulatory issues, and broader improvements in transparency and accountability that could impact trade. From the business standpoint, the classification of methods of trade facilitation is not as important as taking action that will in fact promote trade.

Given both limited governmental resources and, perhaps more importantly, limits of attention in the policymaking process, it is therefore vital to set priorities. We need to know what types of interventions deserve the most attention and resources. In order to determine this, we would require a catalogue of possible issues and interventions in order to find out what is in the choice set. Different issues of policy, technology, and private practice come up at every stage of the movement of goods, from the initial movement from the factory to the port, through port logistics (both seaport and airport, including land border crossings), international transport, customs clearance, to distribution in the importing country including wholesaling and retailing (Ferrantino, 2012). The metrics appropriate to assessing policy interventions in each of these areas include costs, time, uncertainty, and by extension, the impact of changes in each on actual trade flows and on broader measures such as GDP and welfare. Moreover, the possibility of interaction effects should be taken into account, since improvements in one area without accompanying improvements in other areas might have little effect.

This chapter attempts to survey the types of interventions whose effects should be compared in order to make informed policy choices as well as the quality of evidence that is available at present. The discussion follows the approximate order in which goods move along the supply chain from the producer to the consumer, with a bit of backtracking. It will also touch on the relative ease or difficulty of making different interventions, and the reasons for this. This approach is meant to be suggestive rather than exhaustive. Important contributions in many areas will either be overlooked, due to author ignorance, or set aside due to lack of space. However, the aim is that the reader will gain at least a clearer idea of what might be done, and what we do or do not know about the effects of action. In addition, I hope to at least raise some questions about the sources of inaction. Which measures to improve the supply chain are costly in financial terms? Which are technically complex? Which are impeded by rent seekers who benefit from the status quo?

11.2. Infrastructure versus border measures – which is more important?

One issue that has regularly come up in policy discussions of trade facilitation is whether “hard” or “soft” trade facilitation is more important for improving trade performance. Hard trade facilitation is usually used to signify improvement to roads, seaports and airports – or overall transportation infrastructure – and also sometimes to telecommunications infrastructure. Soft trade facilitation refers to improvements in customs procedures, such as single windows and trusted-trader programmes, as well as measures to improve transparency and reduce corruption. The WTO trade facilitation agenda mainly focuses on soft trade facilitation, and much of the WTO debate so far centers on whom will pay to implement reforms, and whether any financial contributions made by wealthy countries can be used to support physical infrastructure as well as customs modernization (Washington Trade Daily, 2012). One thing we would like to know is whether hard or soft trade facilitation has a bigger “bang for the buck,” as determined by some appropriate metric. Another is how much each costs. It is generally believed that hard trade facilitation is much more expensive than soft, although there are certainly costs associated with soft trade facilitation such as automation and training. One area we would like to focus on is to identify the costs of each and to find an appropriate metric to measure whether soft or hard trade facilitation has a “bigger bang for the buck”.

In principle, we would like to know the marginal contribution to the lowering of trade costs for each additional dollar spent on each type of trade facilitation, not only regarding “hard” versus “soft” but also subcategories within each (roads versus ports and airports, programmes for authorized operators versus advanced rulings versus processing zones, training versus automation, and so on.) Ideally, these would be measured in a series of randomized field trials, as is sometimes done for localized anti-poverty interventions in developing countries.² It is difficult to imagine implementing (or not) large projects like road building or customs reform by random assignment. This leaves the effects of different patterns of intervention on a cross-country basis to be determined by econometric or survey methods. Depending on one’s methodological stance, good econometrics is either a perfectly serviceable method for randomized trials (Angrist and Pischke, 2009) or hopelessly misleading (Manzi, 2012).

An example of the type of information arising from econometrics is provided by Wilson et al., (2005). Using trade data for 2000 and 2001, they estimate the potential gains in merchandise trade if all countries with below-average performance were to improve the level of four indicators halfway to the global median. The resulting gains break down as follows: port efficiency (airports and seaports) US \$107 billion, service infrastructure (internet) US \$154 billion, customs US \$33 billion, and regulatory environment (transparency and corruption) US \$83 billion. If we group port efficiency and service infrastructure as “hard” trade facilitation and the rest as “soft,” that gives US \$261 billion of potential gains from “hard” policies and US \$116 billion from “soft.” However, it is not quite so simple – some of the gains from improving transparency and reducing corruption are no doubt economy-wide and not trade facilitation *per se*, and some improvements in port efficiency might be achieved by “soft” policies such as privatization.

By comparison, a 2012 survey (World Economic Forum, 2013) asked respondents in the retail and manufacturing industries which trade facilitation issues added the most to the c.i.f. price of goods they were familiar with. The cost increases were attributed 34 per cent to transport and communications infrastructure, 25 per cent to border administration, 21 per cent to the business environment – including the regulatory environment, investment policy, security, and related issues – and 20 per cent to market access, which includes not only tariffs, but NTMs, SPS/TBT requirements, quotas, licenses, rules of origin and related issues. While these results are based on a small sample size (< 100), and pose similar definitional questions as the econometric results just presented, they also suggest that infrastructure issues weigh larger than border administration issues, although in terms of cost reductions per unit of expenditure, improvements in customs administration might still be a bargain.

A third metric, related to time, can be obtained from the World Bank's Doing Business Report, (2013). Of the total time involved in exporting from Sub-Saharan Africa in 2012, approximately 20 days are accounted for by document preparation, customs clearance and technical control (soft issues), while about 10 days are accounted for by port and terminal handling and inland transport (hard issues). Similar splits are observed for importing, and for other developing regions – although for Eastern Europe and Central Asia, including a number of remote and landlocked countries, the average time associated with hard issues is about half the total. The same source also reports that since 2006, most of the observed time savings has come from reforms in document preparation.

Casual observation suggests that some aspects of trade-related infrastructure in developing countries have improved more rapidly than others. The diffusion of cell phones and the Internet in the last decade has been dramatic, while physical conditions in roads and ports are unlikely to have improved as much. Some evidence suggests that the impact of improvements in trade costs on communication infrastructure is larger for rich countries than for poor countries, while improvements in transport infrastructure are relatively more important for poor countries, with transport and communications being of approximately equal importance for a country such as Malaysia (Zhai, 2010). If this were true, the implication would be that while everybody's trade costs have been reduced, the reductions have been disproportionately greater for high and upper-middle income countries. This is a point worth further examination, as it may lead to a stronger argument for the relative importance of physical infrastructure for trade.

These results and others like them, taken together, are by no means dispositive, and suggest that we need to know more. But in broad terms, it can be said that the difficulties created by inadequacies in hard infrastructure are still quite large, but that the potential gains from improving border administration measures may be cheaper and easier to achieve and are still significant.

11.3. Movement to and from the port

The first step in the journey of goods in international trade is the move from the original farm or factory to the port or seaport to which they must travel. The measurement of land transport times in the *Doing Business Report* gives some idea of the long periods of time necessary to move goods to port, particularly for landlocked countries. But point estimates only tell part of the story. Just as important, if not more so, is the uncertainty involved in land transport under difficult conditions, leading to a “long tail”

of adverse outcomes. That is, if the average time to traverse a particular land route is four days, the distribution of travel times is highly skewed, so that transit times exceeding 10 or even 20 days occur with significant probability (Arvis et al., 2012). The road from the border of Burkina Faso to the port at Tema may take two days to transit under ideal conditions, and might take six hours if it were paved and maintained according to OECD standards. Random occurrences might include a flooded bridge, a broken axle (requiring a repair crew which may also take several days to arrive, even if the driver has a cell phone) or an unauthorized checkpoint for bribes.

This unpredictability may affect the linkage of land transport to the port (Christ and Ferrantino, 2011). If a truck arrives too late, it may miss a scheduled ship departure. If it arrives too early, this causes a waiting period which could cause perishable cargo to spoil or, in the absence of adequate warehousing facilities, non-perishable cargo to be stolen. It could even cause disruption in stages of the production process that have to be timed closely relative to the departure of the truck. For example, the de-greening of pineapples must take place a certain number of days before harvest, with truck loading following immediately thereafter.

Since analysts have been able to derive a value for the cost of time in trade (Hummels and Schaur, 2012), the value of reducing such time can be compared to a tariff reduction, albeit the value of reducing uncertainty is more challenging. Such a value could be compared to the costs of reducing transit time for movement to port. It might be assumed that the costs of paving roads are very high. However, not all costs associated with movement to port are directly linked to road quality. The actual price of trucking services in remote developed countries often substantially exceeds the marginal cost of providing such services due to the presence of trucking cartels (Arvis et al., 2012). This suggests that land transport may not be so unlike customs in that there may be “soft” low-cost interventions that lower its cost. There may also be some endogeneity between road quality and trucking prices. That is, the challenges involved in driving on very bad roads create an implicit barrier to entry, which may facilitate cartelization among the small number of firms willing to drive on such roads. Anecdotal observation suggests that repairing roads induces complimentary investments in vehicles, because a new vehicle is less likely to break down on a good road. Thus, road repairs might also promote competitive entry into trucking services.

Impediments to the road system also affect domestic distribution systems at the other end of the supply chain, and interfere with the movement of both imported and

domestic goods. A recent study of India's agricultural trade (USITC, 2009) examined the road system, and found again a mixture of “hard” and “soft” issues leading to long and unreliable transit times. Many roads are in poor condition and consist of mixed traffic (freight trucks, private cars, bicycles and animal-drawn carts), with few having limited access – an expensive infrastructure issue. On the other hand, trucks are compelled to stop at state borders due to differing state regulations on weight, emissions and safety, as well as to collect entry taxes. Such issues in principle could be addressed without any new road building.

11.4. Ports, airports and connectivity

A number of studies identify differences in port efficiency and maritime services across countries as significant determinants of the volume and the costs of trade. For seaborne trade, both the efficiency of the port and the cost of international transportation services are relevant. The improvement of ports is in part an infrastructure issue – road access to the port and adequacy of warehousing space are important. But some significant cost differences in ports and in maritime transport can be traced to policy, implying that gains can be achieved by “soft” measures. Port services are more expensive when shippers are required to pay for mandatory port services, such as a fee for use of the gantry crane even when the ship's own crane is actually used. The presence of organized crime is also a significant determinant of port costs (Clark et al., 2004). Governance of seaports is also a significant determinant of port efficiency. The government may own the port and operate services (service ports), allow private firms to supply services (landlord ports), or also allow private firms to lease and operate port assets (tool ports), (Fink et al., 2002). Improvements in port governance that allow a greater role for the private sector can bring about substantial improvements in performance (Londoño-Kent et al., 2003).

The determinants of maritime transport costs *per se* include the long-run trend towards the use of regularly scheduled liner routes (as compared to “tramp” routes which go wherever cargo is) and the closely associated spread of containerization which improves efficiency on many products. The impact of liner conferences and other international price-fixing agreements has been found by some studies to be substantial, while others have argued that the role of conferences has declined over time, necessitating mergers among shipping companies to maintain market power. This area of policy deserves closer examination, as the reach of national antitrust policies on the high

seas is unclear. Similarly, the decision to open markets for air transport to foreign carriers in the form of “open skies” agreements has a measurable impact on prices (Micco and Servrisky, 2004).

Another force raising rates for developing countries is the negative relationship between the size of the market and the number of transport companies that find it profitable to serve the market. This phenomenon is familiar to personal travellers in developed countries – one finds more competition and lower rates between New York and Chicago than between Fargo and Albuquerque. Both for air travel (Arvis and Shepherd, 2011) and for sea travel, the network connectivity of remote places is lower. There are significant cost advantages associated with being a hub, like Singapore or Rotterdam, than a spoke like the ports in many developing countries. It is notoriously faster and easier to travel from an African port to Rotterdam than between two African ports for which the distance is much shorter, because of the lack of scheduled routes.

The fact that poor countries have low international transport traffic, and thus have limited competition for services, raises a problem of causality. Are transport services limited because the country is poor, and demand is low? If such is the case, then there may be a “low-level poverty trap” of the sort difficult to overcome by policy. Alternately, are countries poor in part because transport options are limited? The evidence that efficient ports and low transport service prices promote exports and imports, which in turn promote development, suggests that improvements in transport can lead to development. The historical experience of the countries that are first to develop suggests the same. See Mokyr, (2010) on Great Britain.

This does not necessarily mean that expenditures on seaport and airport infrastructure cannot be poorly conceived or wasteful, especially if they are not accompanied by market access to those service providers who can best help the facility to operate efficiently. The question of market access and national treatment for firms in express delivery, third-party logistics and related industries points to the linkage between trade facilitation and services liberalization. The quality of services associated with transport is also likely to be associated to the types of goods traded – so-called “advanced technology” products – such as electronics that usually have longer supply chains than primary products, and countries without adequate facilities for the physical movement of these goods practically exclude themselves from participation in their trade.

11.5. Customs, tariffs, and related issues

It seems plausible that the costs of implementing customs reform are low relative to the cost of upgrading physical infrastructure, and that the (monetizable) gains in transit time are non-trivial. Thus, even if there are more absolute gains to trade and welfare available from infrastructure improvement, on the margin the gains per dollar of expenditure may be higher for customs. Moreover, customs is an easier topic for the WTO to take up than physical infrastructure; the Doha Round trade facilitation negotiations are rooted in topics addressed in GATT 1947. Let's look a little deeper.

Customs upgrading may be cheap in a relative sense, but it is not free. There are often expenditures involved both for electronic document management and training. Many customs systems still rely heavily on “heaps” of difficult-to-search paper. The role of IT in customs is critical. The ability of traders to file documents on line, especially in a single-window arrangement which facilitates communication with multiple government agencies simultaneously, leads to significant efficiency gains. Properly trained customs staff with access to information can also apply risk assessment schemes. This means that instead of inspecting every package, an algorithm is used to identify those packages which have a high probability of needing to be seen – because the products have high duties, the shipment raises security, regulatory, or intellectual property issues – while randomly sampling the other packages at a low rate. This reduces wait time. Automation also reduces the scope for corruption by increasing transparency. This is true for port automation as well as customs automation. A port official may claim that a container is difficult to locate, or a customs official may claim that a package is “somewhere” in the inspection queue, in either case demanding a “speed payment” for locating the shipment. Such incidents are less likely if a supervisor can verify the claim using an electronic database. Countries which adopt the ASYCUDA electronic data standard also facilitate an international exchange of information.

Moreover, it is often reported that “soft” customs is the bottleneck in the port or airport, which means that customs inefficiency could lead to knock-on inefficiency in the “hard” transport operations. If we observe ships floating in the ocean waiting for their turn to berth, the first suggestion might be to build more berths, which may get rejected on costs. However, if trucks are also queued up at the port exit gate because customs is slow to do their job, everything may back up behind customs as well. Reducing the customs bottleneck could create a positive externality for the rest of the port.

Somebody once observed that even if a country chose a mercantilist policy, they would not deliberately place rocks in their own port. One wonders why a similar observation does not apply to inefficient customs. Improvements in customs are made on a unilateral basis all the time. In the twelve months ending June 2012 alone, 22 countries improved some aspect of customs procedures, risk management or related port procedures (World Bank, 2013). What do the countries have in common that do not reform customs? One suspects a political economy motive – if the inefficiencies are linked to corruption, there is a constituency against reform.

We have some quantitative information on how the various measures referenced in the draft WTO trade facilitation text influence trade costs in OECD countries (Moisé et al., 2011), for which advance rulings appear to be most important. For these countries, an indicator of “governance and impartiality,” which may be a proxy for corruption, yields ambiguous results. As yet, there is no comparable information for developing countries. It is likely that there are interactions between corruption and transparency issues and the effect of more formal customs measures.

Finally, a fair amount of customs administration is taken up with collecting *de minimis* tariffs (variously defined as less than 1 per cent or 5 per cent *ad valorem*), many of which are legacies of the formula tariff cuts in earlier GATT rounds. Such duties may have minimal impact either in their effect on domestic producers or on customs revenues, although this is an empirical question. Agreements to eliminate *de minimis* duties could have a salutary impact on customs efficiencies.

11.6. Product standards – SPS and TBT

The presence of classic non-tariff measures (NTMs) is one of the prevalent issues in global supply chains. In recent years, measures arising from national regulation such as sanitary and phytosanitary standards (SPS) and technical barriers to trade (TBT) have become increasingly common relative to more traditional NTMs such as quantitative restrictions and automatic licensing. Regulatory NTMs impact at least two stages of the supply chain – the original production stage, because costs of production can be increased by efforts to comply with product standards (Maskus et al., 2005) and the import procedure stage, because inspection and testing may cause delays (the description of regulatory NTMs as “behind the border” does not always reflect the physical layout of import facilities).

NTMs are unlike tariffs and transport impediments in that we do not have a simple “less is better” metric for measuring progress in reducing them. Indeed, NTMs may be the most challenging area in the field of trade costs when it comes to keeping a scorecard. It is universally recognized that countries may adopt domestic regulations for safety, health, environmental or other reasons, and that such regulations may apply to international trade so long as they are non-discriminatory, according to the principle expressed in GATT Article XX and the WTO's SPS and TBT Agreements. Thus, if we have a catalogue of NTMs we do not know *per se* that simply striking items from the catalogue improves welfare. It may not even promote trade in all instances, since in some cases a stricter regulatory environment is associated with enhanced product quality and higher prices. It is possible to measure a “tariff equivalent” for NTMs, which captures their impact on traded-goods prices (Ferrantino, 2006) and thus to work out the impact of NTMs on trade, but from a policy standpoint any distortion in trade patterns needs to be weighed against welfare benefits that may arise from regulation.

In principle, one would want to identify cases of NTMs for which the trade-restricting effect substantially exceeds the contemplated welfare benefit, and modify or eliminate those. Casual empiricism suggests that there may be many cases falling into this category. SPS and TBT issues loom large in catalogues of NTMs (in 2010, the Office of the United States Trade Representative tripled the size of its *National Trade Estimate* report, adding separate volumes for SPS and TBT), in surveys of traders' complaints (Basu et al., 2013) and in the activity of trade policymakers, as measured both by new chapters on SPS/TBT in “deeper” free trade agreements (FTAs) and in issues arising before dispute settlement. It is notoriously difficult to point to cases in which the negotiation of an FTA actually eliminated an NTM with trade-expanding effect, although sometimes FTAs can promote convergence of standards.

The relatively slow process of modifying or eliminating “bad” NTMs may be due to the large amount of political will it takes to overcome national preferences for particular types of health, safety or environmental regulation. Countries that “lose” at WTO dispute settlement on NTMs often prefer to absorb the authorized sanction rather than modify their policies. Even in the presence of seemingly high political will the process of regulatory coordination is massively difficult. The Single European Act of 1987 launched a programme of standards convergence for the existing members of the European Community. Six years later, 20 per cent of the national legislation required to create the regulatory “single market” was still not implemented, including 58 per cent of the regulations for medical devices (USITC, 1994).

The difficulty of negotiating changes in NTMs has led to approaches that recognize the need for flexibility so that the gains from convergence can be reconciled with national sovereignty and some differences in national practices. The implementation of the Single Market in the EU-10 countries of Central and Eastern Europe highlighted the use of a mix of approaches. Some cases were dealt with by the “old approach” of detailed harmonization using exhaustively specified directives, others by a “new approach” focusing on essential requirements of products while giving manufactures more flexibility as to how to satisfy those requirements, and those handled by the principle of mutual recognition, an acknowledgement that a partner country’s regulations afford equivalent levels of protection to those achieved by domestic regulation, even though they are very different (Brenton et al., 2000). The use of good regulatory practice and regulatory impact analysis in establishing regulations in the first place can make discussions of regulatory convergence easier and minimize future trade conflicts over regulatory issues (Johnson, 2009).

11.7. Distribution, wholesaling, and retailing

Once the goods have cleared the port or airport and are on the truck, the last step in the supply chain is getting the goods to the consumer. Since this part of the supply chain is more fully behind the border, it has received less attention from international economists. Yet distribution, wholesaling and retailing probably contribute a considerable amount to the total mark-up between ex-farm or ex-factory prices in the exporting country and consumer prices in the importing country. Mention has already been made of the way in which difficulties in domestic transport raise costs and time in the movement between the port of entry and the final consumer. Inefficiencies and restrictions in wholesaling and retailing have a comparable effect. Competition in these areas can lower costs, including international competition. However, existing policies in many countries impose barriers to entry. Many of the recent cost reductions in distribution have been brought about by large multinational retailers, which take advantage of advances in logistics and computerized product tracking. Market access and national treatment for such firms is often resisted because of the possible exit of smaller “mom-and-pop” retailers, or of concerns that global retailers threaten to undermine the preservation of national culture. Existing restrictions on retailing have a substantial impact on the marketplace. For a sample of twelve mostly developed countries, a reduction in the restrictiveness of retail policies to the mean level is associated with an increase of US \$75 billion in sales (about 35 per cent) of foreign-owned retailing affiliates, of which over US \$60 billion would be in Italy and France (Reisman and Vu, 2012.) One modeling exercise

focusing on FDI suggests that liberalization of multi-brand retailing in India would lead to substantial increases in foreign presence without necessarily reducing the output of domestically-owned retailers, especially if the presence of foreign retailers leads to productivity spillovers to the domestic distribution sectors and to upstream suppliers such as farmers (Lakatos and Fukui, 2012).

11.8. Summary and lessons for policy

The types of policies that may reduce costs, time and uncertainty along the supply chain are diverse both in terms of the level of policymaking involved and their costs. Some measures, such as improving bad feeder roads in developing countries, may be expensive and involve national or local resources. Measures to improve customs can be undertaken unilaterally and may not be too expensive but can be facilitated by technical assistance. Trucking deregulation can also be achieved unilaterally, perhaps at the stroke of a pen. Improving market access in logistics, express delivery, telecommunications and retailing can be a matter of negotiation or of unilateral action. Reforming the ways in which international shipping rates are set may be both international in scope and involve innovation in policy. Limiting the negative trade impact of regulatory NTMs may involve difficult negotiations.

After reviewing the evidence, it appears that the North-South divide over how trade facilitation should be approached is based at least in part on empirical features of the actual trading world. The absolute gains from improving transport and communications are probably very large and comprise a substantial component of the overall gains from national economic development, including in the domestic economy. At the same time, the reduction in trade costs per dollar might be largest for “soft” reforms such as customs modernization. This does not mean that action in either “hard” or “soft” areas of trade facilitation needs to be postponed because the other is seen as a higher priority. Further quantitative research can help with setting priorities. It is also useful to recognize that there are interaction effects between reforms at different stages of the supply chain, so that a “soft” reform may help address a “hard” problem and vice versa. The intimate relationship between “hard” port reform and “soft” customs reform is a good example of this.

Reducing trade costs is, on the whole, a win-win proposition. This should not blind us to the fact that in a number of cases, political economy issues may need to be overcome before progress can be made in reducing trade costs. There are obvious beneficiaries from barriers to entry in trucking, shipping and retailing. There are

also rent-seeking gains from corruption in customs and in the operation of ports. Similarly, there may be rents to be earned from regulatory NTMs that are designed, intentionally or otherwise, to have a trade-reducing effect unnecessary to achieve the safety, health, or environmental benefits intended to be secured by regulation.

In any reform process, the easy steps are taken first, leaving the tough ones for later. The difficult steps often involve questions of rent-seeking and political economy. In the case of tariff liberalization, historical experience has revealed where the “big dead bodies” of rent-seeking lie, most notably in agriculture and textiles and apparel. As supply chains continue to improve, we will discover by future historical experience what the tough nuts are to crack. Some of these may be purely technical challenges, such as the projected trans-African highway system, but others are likely to lie in the areas where established interests that benefit from high trade costs are most predominant.

Endnotes

- 1 The author is Lead International Economist, U.S. International Trade Commission. This paper reflects solely the views of the author and is not meant to represent the views of the U.S. International Trade Commission or any of its Commissioners.
- 2 See <http://www.povertyactionlab.org/about-j-pal> for examples.

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12 Can SMEs participate in global production networks?

Evidence from ASEAN firms

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12.1. Introduction

This paper examines factors influencing the participation of small and medium enterprises (SMEs) in the Association of Southeast Asian Nations (ASEAN) economies in global production networks. SMEs – which are seen as the backbone of employment and poverty reduction in ASEAN economies – have returned to the spotlight with expanding global production networks in East Asia. Greater SME participation in global production networks through closer linkages with multinational corporations (MNCs) and direct exports can be a potent means of accelerating technology transfer, spillovers and economic development (Hobday, 2001; Lim and Kimura, 2010). Facing a fragile world growth outlook, the ASEAN and East Asia Summits in 2011 have emphasized SMEs as a vehicle for increasing intra-regional trade, rebalancing towards domestic and regional demand and inclusive growth in Asia.¹

A sizable body of research has analysed production fragmentation and economic implications. Two alternative approaches have been used to quantify the magnitude of trade occurring within global production networks. The first uses national trade data obtained from the UN trade data reporting system to identify trade in parts and components (Ng and Yeats, 2003; Athukorala, 2011). It suggests that East Asia's trade is increasingly made up of parts' and components' trade which suggests that global production networks are growing in importance. The second approach – relying on input output tables to trace value added in production networks – suggests that value added seems a more accurate means of capturing production network activity than trade data (Koopman et al., 2010; WTO-IDE-JETRO, 2011). Neither approach, however, sheds light on the links between firm size and the region's production

networks. Case studies show that large MNCs, which use the region as an international production base, drive the process of production fragmentation (Kuroiwa and Heng, 2008; Kuroiwa, 2009).

Research on the contribution of SMEs in ASEAN economies to global production networks is scarce and sometimes contentious, often due to different definitions used and timeliness. Studies show that SMEs account for the majority of firms and half of the employment in ASEAN economies (Harvie and Lee, 2002).² Yet concerns exist that the internationalization of SMEs remains an emerging trend (Harvie, 2010; Trinh et al., 2010). The SMEs in ASEAN economies seem to make little contribution to international trade relative to the sector's size or employment contribution (Harvie and Lee, 2002). It is possible that the average SME's export share in ASEAN economies may be understated if indirect exports through subcontracting or input supply are included (Tambunan, 2009). Furthermore, Malaysia, Singapore and Viet Nam are notable for having higher SME export shares than others. Nonetheless, with SMEs in more advanced East Asian newly-industrialized economies (NIEs) such as Chinese Taipei and China contributing more to exports, room exists for the advancement of SMEs in ASEAN economies' trade through global production networks. Multiple market failures are said to exist in relation to SME development and local entrepreneurship which may be mitigated by appropriate policies (Tambunan, 2009; Lim and Kimura, 2010).

There are few firm-level econometric studies (covering production networks or exporting) in ASEAN economies (see Table 12.1 for a summary of results) and it is difficult to draw general conclusions for three reasons. First, the coverage of countries and sectors is somewhat limited in these studies. Typically, studies have looked at a single country and a specific sector within manufacturing (such as electronics). There are a couple of multi-country, multi-sector studies (Harvie et al., 2010; Wignaraja, 2011) and one multi-country single sector study (Rasiah, 2004). Second, most work is based on small samples of enterprises. With the notable exception of Van Dijk (2002), nearly all the studies have fewer than 1,000 firms and two draw on fewer than 200 observations. It is difficult to generalize the findings from small sample studies. Third, there is insufficient comparative firm-level analysis. Although a couple of studies deal exclusively with SMEs in production networks (Harvie et al., 2010; Rasiah et al., 2010), none compare the behaviour of SME exporters with large firms or SME exporters with indirect SME exporters.

The paper undertakes two kinds of analysis of factors affecting the participation of SMEs in ASEAN economies in global production networks (hereafter production

networks). The main focus of the research is an econometric analysis of firm-level factors affecting participation in production networks drawing on recent empirical literature on international trade, industrial organization and technology. Highlighting the notion of heterogeneity of firms in international trade, this literature points to certain firm-level characteristics (such as size, skills and technological capabilities) as shaping firm-level participation in production networks. As the overall business environment impinges upon SME participation in production networks, the research also explores selected policy influences including a ranking by SMEs of the main obstacles to conducting business in ASEAN economies as well as SME perceptions of business and support services.

The econometric analysis attempts to remedy gaps in existing firm-level studies. It covers five ASEAN economies (Malaysia, Thailand, Indonesia, Philippines and Viet Nam) and a wide range of industrial sectors. Second, the data set used here is a large one from the World Bank comprising 5,900 manufacturing enterprises (including 70 per cent SMEs), which were randomly selected using a comprehensive questionnaire. Third, the analysis is based on two alternative econometric models, one for all firms in production networks (direct and indirect exporters) and one for sustained exporters only. Each model was estimated separately for SMEs and all manufacturing firms. In line with the standard Organization for Economic Co-operation and Development (OECD) definition, SMEs are defined here as enterprises with fewer than 100 employees (OECD, 1997). To the best of our knowledge, this is the most comprehensive analysis of its kind attempted for ASEAN economies.

For convenience, internationalization of SMEs in relation to production networks can be defined in terms of three types of activities (OECD, 1997; Hollenstein, 2005): direct exporting or importing (which is usually the most frequent type of international activity); indirect exporting as subcontractors to large firms or input suppliers (which is somewhat common); and foreign direct investment (FDI) in overseas locations by SMEs (which is more risky than home market production or trade). This research looks only at the direct and indirect exporting behaviour in SMEs in ASEAN economies due to a lack of data on FDI by SMEs.

Section two reviews the literature. Section three sets out the empirical methodology. Section four describes the data set and provides data on SMEs engagement in production networks. Section five presents t-test and econometric results. Section six explores selected policy influences on enterprises. Section seven concludes.

12.2. Literature review

An established body of trade, industrial organization, and technology literature points to the overwhelming importance of firm-specific factors, on which competitive advantages are built. As background to this study of the role of SMEs in production networks, key aspects of the theoretical and empirical literature are discussed here.

Theory

Four main strands of theory can explain trade and production network activity of firms, which is the focus of this paper. The neo-Heckscher-Ohlin model and Vernon's concept of the product cycle provided the early rationale for studies highlighting the importance of firm-specific advantages (such as differences in skills, technologies and tastes) in the operation of industry-level determinants of comparative advantage (Lall, 1986; Wilmore, 1992; Wakelin, 1998).

The fragmentation of production approach – found in seminal works by Jones and Kierzkowski (1990) and Arndt and Kierzkowski (2001) – refined these insights. It showed how increasing returns and the advantages of specialization of factors within firms encouraged the location of different stages of production across geographical space connected by service links. Products traded between firms in different countries are components rather than final goods.

Furthermore, the “new new” trade theory of Melitz (2003) and Helpman et al., (2004) emphasized firm heterogeneity in international trade (that firms are considered different in terms of efficiency and fixed and variable costs when involved in trade). Accordingly, only a few highly efficient firms are able to export and invest overseas as they are able to make sufficient profit to cover the large trade costs required for overseas operations.

Finally, the technological capability and national innovation systems approach reveals a different channel through which firm behaviour affects export performance. Focusing on innovation and learning processes in developing countries, proponents emphasize the acquisition of technological capabilities as a major source of export advantage at firm level (Bell and Pavitt, 1993; Lall, 1992; Iammarino et al., 2008). The underlying evolutionary theory of technical change emphasizes that difficult firm-specific processes and complex interactions with institutions are needed to absorb imported technologies efficiently (Nelson and Winter, 1982).

Implicit in most of the above theories is the notion that SMEs are at a disadvantage in participation in production networks compared with large firms. The SMEs face, to a higher extent than large firms, resource constraints (in terms of finance, information, management capacity, and technological capability).³ In addition, SMEs suffer disproportionately from external barriers like market imperfections and regulations. Accordingly, the probability of SMEs joining production networks (as direct exporters, indirect exporters, or overseas investors) is lower than that of large firms. Furthermore, justification exists for public policies to support the entry of SMEs in production networks. In the main, such support should be geared to an enabling environment that opens access to markets, reduces bureaucratic impediments against SMEs and provides appropriate SME institutional support services (for example, technological, marketing and financial support).

Empirical studies and hypotheses

The relationship between firm size and exports at enterprise level has attracted considerable interest in a growing econometric literature (Kumar and Siddharthan, 1994; Zhao and Li, 1997; Wignaraja, 2002; Srinivasan and Archana, 2011). There have also been econometric studies of SMEs and exports (Lefebvre and Lefebvre, 2001). A very few recent econometric studies have begun to explicitly look at the link between SMEs and production networks (Harvie et al., 2010; Kyophilavong, 2010; Rasiah et al., 2010). Several studies report that the characteristics of firms vary widely within industries. Firms which are involved in exports or production networks are larger, more efficient, and have higher levels of skills than other firms. Relevant studies will be discussed below in order to formulate hypotheses for empirical testing in this paper.

Firm size. Most studies are based on the conventional assumption that large firms are more competitive than SMEs in international markets (Zhao and Li, 1997; Van Dijk, 2002; Srinivasan and Archana, 2011). A positive relationship between size and exports is thus reported. Similar arguments can be made about participation in production networks through direct and indirect exporting. Owing to scale economies, larger firms may have lower average and marginal costs, which would increase the probability of participation in production networks. Furthermore, large firms have more resources to meet the fixed costs of entry into production networks (like information, marketing and technology expenses). A few studies, however, report no relationship or a negative one. This conflicting result can be partly attributed to the non-linear nature of this relationship (Kumar and Siddharthan, 1994; Lefebvre and Lefebvre, 2001). It may be that economies of scale and fixed

costs are significant in the early stages of joining production networks but less relevant in the longer term. For instance, SMEs may join together in industrial clusters and collectively overcome the disadvantage of firm size. Alternatively, some SMEs might concentrate on niche markets and emerge as leading enterprises. As a result of the above discussion, the following hypothesis is proposed. Hypothesis one – firm size is expected to have a positive effect on participation in production networks up to a given threshold but may not matter later on.

Foreign ownership. A joint venture with a foreign partner (or 100 per cent foreign equity) facilitates participation in production networks, as it enables SMEs to reap the ownership advantages of parent companies (Wilmore, 1992; Nguyen and Nishijima, 2009; Srinivasan and Archana, 2011). First, access to the superior marketing connections and know-how of parents enables direct and indirect exporting. Second, access to parents' accumulated learning experience of export production as well as access to sophisticated technologies and management experience improves technical efficiency. The transfer of such ownership-specific advantages depends on whether the foreign firm has a controlling interest in the domestic venture. A controlling interest typically can occur with minority foreign equity in a project rather than total foreign equity. In most of the previous literature on firm-level exporting and participation in production networks, it has been consistently observed that foreign ownership matters. These arguments lead to the following proposition. Hypothesis two – foreign ownership is positively related to participation in production networks because it provides access to superior marketing, technology, and management expertise.

Human capital. Within a given activity, a higher level of human capital contributes to a firm's export performance. Higher levels of human capital are generally linked with the development of more effective business strategies and more rapid technological learning that can provide a competitive edge at enterprise level (Van Dijk, 2002; Dueñas-Caparas, 2006). Those SMEs with a stock of high-quality human capital are expected to be more likely to engage and perform well in production networks as this is essential for forging close supplier relationships with large exporters, effective technology transfer and efficient production of orders (Harvie et al., 2010). Although human capital at all levels is important, workers' education and the chief executive officer (CEO)'s education and experience are particularly significant for SMEs involved in production networks. A literate workforce made up of high school graduates is more productive and adaptive to new technology than one that is not. Furthermore, a CEO with a college degree or vocational training as well as work experience may have a better business attitude (in terms of risk taking or willingness

to implement new business ideas). In very small firms, with few high school-educated workers, much of the firm's human capital may be reflected in the quality of the CEO's education and experience. Accordingly, hypothesis three proposes that higher levels of human capital – in terms of secondary level educated workers or well-educated and experienced CEOs – are positively related to participation in production networks.

Technological capabilities. Previous empirical studies indicate that firm-level technological capabilities contribute to export performance (Zhao and Li, 1997; Hobday, 2001; Rasiah, 2004; Wignaraja, 2002 and 2011). Building technological capabilities in developing country firms, particularly SMEs, is not just a simple function of the number of years of production experience. Rather, it requires conscious investments in creating skills and information to operate imported technology efficiently. Such investments involve a spectrum of technological activities such as technology search, quality management, engineering and R&D activities (Kumar and Siddarthan, 1994; Lefebvre and Lefebvre, 2001). Importing technology through foreign licenses is an important mechanism for transfer of new technologies and internal capability building. Furthermore, foreign buyers and subcontractors view internal quality standards (like the International Organization for Standardization, or ISO certification) as increasingly compulsory for SMEs to qualify as potential suppliers. Developing new products (or modifying existing products) and taking out patents to protect intellectual property rights also facilitate export competitiveness in SMEs. These considerations suggest hypothesis four – SMEs that have acquired high levels of technological capabilities are more likely to succeed in production networks.

Age. The older the firm, the more accumulated experience in production and tacit knowledge, which is likely to facilitate participation in production networks. Alternatively, mature firms may become complacent with an overreliance on accumulated experience and “set in the past” ways. Meanwhile, younger firms may be at an advantage in joining production networks for two reasons. First, younger enterprises may use relatively modern technology, which increases productivity and product quality (Van Dijk, 2002). Second, they may be more proactive in learning about business and technological opportunities in production networks. For instance, younger firms may be more nimble in seeking out new sources of information and external knowledge such as market information from buyers of output or technical know-how from equipment suppliers. Younger firms may be more flexible in combining external and internal information to realize opportunities in production networks. Bearing in mind these different possibilities, hypothesis five is put forward – firm age needs to be controlled when looking relationships between factors affecting firm-level participation in production networks.

Access to credit. Access to credit for working capital and investment is typically a binding constraint on SMEs involvement in production networks (Harvie et al., 2010). Capital markets in developing countries are highly segmented into a formal bank sector and informal sources due to various market imperfections associated with underdevelopment. Credit from commercial banks is usually cheaper than finance from informal credit sources but requires substantial information about balance sheets and collateral. Many SMEs find it difficult to provide the requisite financial information and collateral and instead rely on internally generated funds or more expensive informal sources. This puts them at a cost disadvantage compared to well-organized SMEs with an established record with commercial banks. Thus hypothesis six emerges – SMEs with access to bank credit are more likely to join production networks than other firms.

12.3. Empirical methodology

In order to examine the firm-level characteristics shaping SMEs' and all manufacturing firms' participation in production networks, the following general equation is estimated:

$$\mathbf{Y} = \beta\mathbf{X} + \varepsilon, \quad (1)$$

where \mathbf{Y} is the vector denoting participation in production networks at the firm level, \mathbf{X} is the matrix of explanatory variables, β is the matrix of coefficients, and ε is the matrix of error terms.

Participation in production networks is captured by a binary variable reflecting different activities by firms in such networks, particularly SMEs. The probit model in two alternative forms was used here. In the first, the dependent variable takes a value of 1 if a firm undertakes any form of activity in a production network (as an exporter, an indirect exporter or some combination of the two) and 0 for a wholly domestic-market oriented firm. In the second, the dependent variable is 1 if the firm's primary mission is to export (defined as more than total sales being exported globally) and 0 otherwise. The first captures all involvement of firms in production networks regardless of the intensity of exporting or indirect exporting behaviour of a given firm. While this definition is inclusive, it encompasses a range of participation in production networks from occasional and limited involvement of firms to more sustained involvement. Accordingly, the second was formulated to represent a more focused mission of sustained involvement in production networks through exports. It is interesting to examine whether the determinants are the same for both models. Our approach refines previous work which did not distinguish between different activities undertaken by SMEs in production networks. For instance, Harvie et al., (2010) simply define SME

participation in production networks according to whether it is a supplier, importer of intermediate goods or exports some of its products.

The hypotheses were described in section two. The explanatory variables in **X** in equation (1) are described below and Table 12.1 has a summary.

TABLE 12.1: Description of variables

Variable	Description
<i>Independent</i>	
Size	No. of permanent workers
Size squared	Square of the no. of permanent workers
SME	Firm has less than 100 employees (1–99)
Foreign ownership	1 if firm has foreign ownership; 0 otherwise
Workers HS	1 if average production worker has high school (HS) education; 0 otherwise
GM primary	1 if general manager/CEO's highest level of education is primary school; 0 otherwise
GM secondary	1 if general manager/CEO's highest level of education is HS; 0 otherwise
GM vocational	1 if general manager/CEO's highest level of education is vocational; 0 otherwise
GM college	1 if general manager/CEO's highest level of education is college; 0 otherwise
GM experience	No. of years of work experience of the GM/CEO
Foreign license	1 if firm uses technology licensed from foreign-owned company (excluding software); 0 otherwise
ISO	1 if firm has a form of internationally-agreed certification (e.g., ISO 9000, 9002); 0 otherwise
Patent	1 if firm has registered patent; 0 otherwise
Age	No. of years in operation
Access to credit	1 if firm has credit line/loan from financial institution; 0 otherwise
Philippines	1 if firm is located in the Philippines; 0 otherwise
Indonesia	1 if firm is located in Indonesia; 0 otherwise
Viet Nam	1 if firm is located in Viet Nam; 0 otherwise
Malaysia	1 if firm is located in Malaysia; 0 otherwise
Thailand	1 if firm is located in Thailand, 0 otherwise
<i>Dependent</i>	
1. All firms in PN	1 if more than 0 % of sales are exported (directly or indirectly); 0 otherwise
2. Sustained exporter	1 if more than 40 % of sales are directly exported; 0 otherwise

Source: Author's calculations.

Firm size is represented by the number of employees. This is commonly used in empirical work as other measures like value added or output are more susceptible to variations in macroeconomic conditions. To provide additional insights, a size-squared variable was also added to some of the models.

Foreign ownership is captured by a dummy variable which takes a value of 1 if the firm has any foreign equity. The standard measure — share of foreign equity — seems to suffer from some noise and may be correlated with number of employees.

Human capital is proxied by the following variables: (i) a dummy variable which is 1 if the average production worker has high school education; (ii) four dummy variables to capture different levels of educational attainment of the Chief Executive Officer (CEO) from primary schooling to college education; and (iii) the number of years of work experience of the CEO. In line with the hypothesis on human capital, these variables attempt to capture the average quality of education of workers and the CEO. In addition, the CEO's experience is included. Most unfortunately, data was not available from the World Bank surveys on the share of engineers and technicians in employment to capture technical-level skills.

Technological capabilities are represented by several variables: (i) a dummy variable which is 1 when a firm has a technology license; (ii) a dummy variable which is 1 when a firm has a form of internationally agreed quality certification (such as ISO 9000 or 9002); and (iii) a dummy variable which is 1 when a firm has registered a patent. Technological capabilities are hard to measure and empirical work has either used aspects of technological activity (quality certification, patents, etc.) or a composite index of technological capability made up of different technical functions performed by enterprises to assimilate imported technologies. The chosen variables were the only technology variables included in the data set for Philippines, Indonesia and Viet Nam. Accordingly, these were included and a composite index could not be constructed.

Age is represented by the number years in operation of the firm. This is more accurate than number of years since establishment as there can be a lag between the legal incorporation of a firm and the start-up of plant operations.

Access to credit is proxied by a dummy variable which is 1 if a firm has a credit line or loan from a formal financial institution.

In addition, four country dummy variables were included to capture country-specific effects of the five ASEAN countries.

12.4. Description of the data

Data and sample characteristics

A major constraint facing research on SMEs in ASEAN economies is the dearth of data at sectoral level and the use of different definitions of what is an SME (such as sales, employment, assets and value of equipment).⁴ Accordingly, this paper relied on firm-level data. Enterprise-level data for manufacturing enterprises from the World Bank's Enterprise Surveys (conducted at infrequent intervals in given countries) were used for the investigation of the role of SMEs in production networks in ASEAN economies. This is the only relatively detailed and recent firm-level data set currently available for these countries. The data are not publicly available but it is possible to apply to the World Bank for access for research purposes. The data for Malaysia and Thailand are for 2006, while the rest are for 2008. Stratified random sampling with replacement was the sampling methodology used.⁵ Face-to-face interviews using a common questionnaire were conducted with business owners and senior managers of firms.

The surveys provide cross-section firm-level information on direct and indirect exports, employment, ownership, human capital, technology, access to credit and aspects of the policy regime. Table 12.2 provides a snapshot of the enterprise data set for the

TABLE 12.2: Sample characteristics

	All firms	Malaysia	Thailand	Philippines	Indonesia	Viet Nam
Number of all firms	5,900	1,082	1,043	1,310	1,422	1,043
By sector, % of distribution						
Garment	11.4	8.2	15.2	10.8	11.6	11.2
Textile	7.6	3.5	12.8	0.2	12.5	9.6
Machinery and equipment	3.6	8.5	8.0	0.2	0.5	2.7
Electronics / Electrical appliances	2.3	8.9	8.7	9.6	0.4	1.8
Rubber and plastic	15.0	25.3	24.7	13.4	10.5	3.0
By size, % of distribution						
SME	69.3	62.7	51.6	78.2	82.1	65.3
Large	30.7	37.3	48.4	21.8	17.9	34.7
By ownership, % of distribution						
Foreign	25.5	30.5	59.9	23.3	6.8	14.0
Domestic	74.5	69.5	40.1	76.7	93.2	86.0

Source: Author's calculations.

five ASEAN economies according to firm size, ownership and sector. The data set largely consists of a total of 5,900 manufacturing firms with reasonable samples of over 1,000 firms for each ASEAN country. A majority of the total sample (69.3 per cent) consists of SMEs (those with fewer than 100 employees), which is useful from the perspective of this paper. The SMEs as a percentage of total number of firms varies by country: Malaysia (62.7 per cent), Thailand (51.6 per cent), Philippines (78.2 per cent), Indonesia (82.1 per cent) and Viet Nam (65.3 per cent). About a quarter of the total sample has some proportion of foreign equity. The share of firms with foreign equity as a percentage of total number of firms is highest in Thailand and Malaysia and lowest in Indonesia.

SMEs in production networks

Table 12.3 provides information on the number of firms in production networks (direct and indirect exporters), SMEs in production networks as a percentage of all SMEs, and large firms in production networks as a percentage of all large firms. A further breakdown of SMEs between small (one – 49 employees) and medium (50–99 employees) is also provided. The following can be observed:

- A minority of the sample firms (37.3 per cent of the total) are in production networks. More developed ASEAN economies such as Malaysia and Thailand have particularly high representation in production networks (nearly 60 per cent of their firms participate). Viet Nam (36.4 per cent) comes next. Philippines (26.9 per cent) and Indonesia (14.5 per cent) have relatively low participation in production networks.

TABLE 12.3: Role of SMEs and large firms in production networks

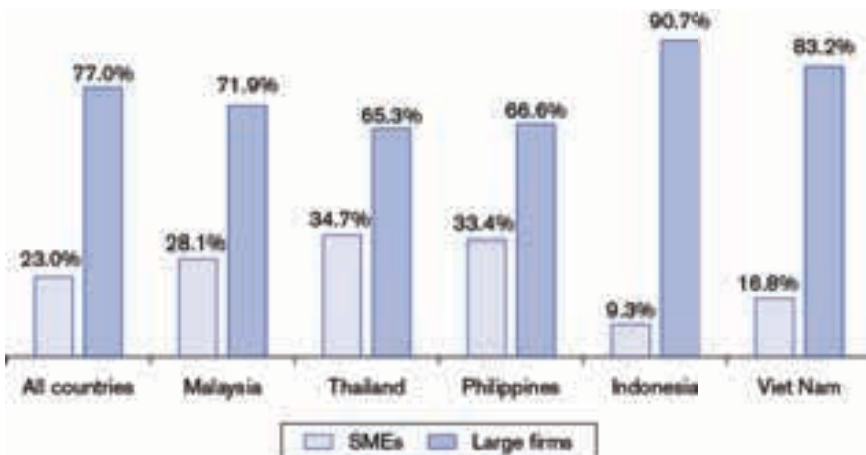
	All Countries	Malaysia	Thailand	Philippines	Indonesia	Viet Nam
Number of firms in PN	2,203	646	619	352	206	380
PN firms as a percentage of all firms, %	37.3	59.7	59.3	26.9	14.5	36.4
SMEs in PN (1–99 employees) as a percentage of all SMEs, %	22.0	46.2	29.6	20.1	6.3	21.4
Large firms in PN as a percentage of all large firms, %	72.1	82.4	91.1	51.1	52.0	64.6

Source: Author's calculations.

- Large firms are the major players in production networks with 72.1 per cent of all large firms participating. Most of the large firms in Malaysia and Thailand are involved in production networks and over half the large firms are in the remaining three countries
- SMEs are minor players in production networks as only 22 per cent of SMEs as a percentage of all SMEs participate. SME participation rates vary considerably across ASEAN countries. As much as 46.2 per cent of all SMEs in Malaysia and 30 per cent of all SMEs in Thailand are involved in production networks. In Viet Nam the figure is 21.4 per cent and in Philippines 20.1 per cent. Indonesia seems an outlier with only 6.3 per cent of all SMEs involved in production networks
- A small fraction of SMEs in production networks are 100 per cent global exporters. The vast majority of such SMEs engage in either a mix of global exports and indirect exporting, or purely indirect exports. Accordingly, only 18.2 per cent of SMEs in production networks in all the countries are 100 per cent global exporters. The figures by country are as follows: Malaysia (14.1 per cent), Thailand (16.4 per cent), Philippines (27.2 per cent), Indonesia (15 per cent) and Viet Nam (19.2 per cent)

Figure 12.1 shows the percentage of exports from SMEs and large firms in total exports. SMEs make a smaller contribution to exports (23 per cent) in all countries

FIGURE 12.1: Share of SME and large firm exports in total exports



Source: Author's calculations.

compared with large firms (77 per cent). Unfortunately, time-series data on exports by firm size are not available from the World Bank surveys. Methodological difficulties notwithstanding, a rough indication may be obtained by comparing this figure for the late 2000s for the share of SME exports with the estimate by Harvie and Lee (2002) for the late 1990s. This crude comparison suggests that the percentage of SME exports in ASEAN economies rose from 14.3 per cent to 23 per cent between the late 1990s and the late 2000s. The country-level pattern of SME export shares is broadly reflective of the picture of SME participation in production networks. Malaysia (28.1 per cent) and Thailand (34.7 per cent) are among the leaders in terms of SME export shares. Philippines, unexpectedly, has a similarly high SME export share (33.4 per cent) which may partly reflect the high proportion of SME numbers in the country sample. Viet Nam has an SME export share of 16.8 per cent while Indonesia has 9.3 per cent.

Another dimension of SME exporting is provided in Figure 12.2 which shows the share of the top 25 per cent of SME exporters in terms of export value. The SME exports are highly concentrated in a relatively few firms in the ASEAN economies – the top 25 per cent of SMEs accounts for 85.8 per cent of SME exports in all countries. Concentration in the top 25 per cent SME exporters is highest in Indonesia (96.3 per cent). This is followed by Thailand (85 per cent), Philippines (78.9 per cent), Viet Nam (76.2 per cent) and Malaysia (69.9 per cent).

FIGURE 12.2: Share of top 25 per cent SME exporters



Source: Author's calculations.

Next, we turn to an analysis of factors influencing SME participation in production networks.

12.5. T-test and econometric results

T-test results

Given the paucity of literature on SMEs in production networks in ASEAN economies, what initial inferences can be drawn about differences between SMEs in production networks and other SMEs (those not in production networks)? Table 12.4 shows the means values of characteristics of SMEs in production networks and other SMEs, along with their T-values. Five findings are noteworthy:

- SMEs in production networks are larger than other SMEs. SMEs in production networks in Malaysia (49.9 employees) are the largest and followed by Viet Nam (46 employees), Indonesia (42 employees), Thailand (41.7 employees), and Philippines (40.3 employees). Meanwhile, other SMEs range from 39.6 employees in Malaysia to 16.5 employees in Indonesia
- Underlining the link between size and foreign equity, there is a significant difference in the share of foreign equity between SMEs in production networks and other SMEs. SMEs in production networks in the Philippines have the highest average foreign equity share, 36.6 per cent, compared with 26.8 per cent in Indonesia, 23 per cent in Malaysia, 20.2 per cent in Thailand and 10.8 per cent in Viet Nam
- There is a significant difference in high school education between SMEs in production networks and other SMEs in all the countries except Malaysia. Likewise, there is a significant difference in internationally agreed quality certification between SMEs in production networks and other SMEs in all the countries
- SMEs in production networks are somewhat younger than other SMEs in three countries, but not significantly so. SMEs in production networks are older than other SMEs in Viet Nam and Indonesia, but the difference is only significant in Viet Nam

TABLE 12.4: T-test on key variables for SMEs in production networks versus SMEs outside production networks

	SMEs in PN	SMEs not in PN	(SMEs in PN- SMEs not in PN)
All countries			
Size (mean)	43.5	25.0	+***
Foreign ownership, (mean %)	24.2	4.3	+***
Age (mean)	15.1	14.8	+
Workers HS, dummy (%)	68.8	38.2	+***
ISO, dummy (%)	27.5	8.9	+***
Malaysia			
Size (mean)	49.9	39.6	+***
Foreign ownership, (mean %)	23.0	5.9	+***
Age (mean)	18.1	19.4	-
Workers HS, dummy (%)	84.3	72.8	+
ISO, dummy (%)	27.0	12.4	+***
Thailand			
Size (mean)	41.7	30.7	+***
Foreign ownership, (mean %)	20.2	6.1	+***
Age (mean)	12.0	12.5	-
Workers HS, dummy (%)	90.4	89.3	+***
ISO, dummy (%)	29.1	11.5	+***
Philippines			
Size (mean)	40.3	25.4	+***
Foreign ownership, (mean %)	36.6	7.6	+***
Age (mean)	16.5	18.2	-
Workers HS, dummy (%)	55.1	33.0	+***
ISO, dummy (%)	35.4	15.5	+***
Indonesia			
Size (mean)	42.0	16.5	+***
Foreign ownership, (mean %)	26.8	1.1	+***
Age (mean)	17.0	15.0	+
Workers HS, dummy (%)	44.6	16.0	+***
ISO, dummy (%)	18.9	3.2	+***

	SMEs in PN	SMEs not in PN	(SMEs in PN- SMEs not in PN)
Viet Nam			
Size (mean)	46.0	27.3	+***
Foreign ownership, (mean %)	10.8	4.3	+***
Age (mean)	9.2	7.8	+**
Workers HS, dummy (%)	42.5	3.9	+***
ISO, dummy (%)	17.8	6.2	+***

Significant at ***-1%, **-5% and *-10% levels.

Source: Author's calculations.

Econometric results

Analysis of means and t-tests provides some insights into the potential relationships between participation in production networks and enterprise characteristics but do not shed light on directions of causality. Thus a probit model was used to estimate the equation specified in section three using the two alternative dependent variables but with the same set of determinants. The results of the probit regressions are shown in Table 12.5 Column one shows the results of the model for all SMEs in production networks, while the results for sustained SME exporters are in column two. The results for all manufacturing firms are in columns three and four.

Following diagnostic testing, we first consider the results for SMEs and then for all manufacturing firms. As indicated by a higher R^2 , the all-SMEs-in-production-networks model better fits the outcome data than the sustained-SME-exporters model. Many of the firm-specific variables are significant, as hypothesized. The coefficient of firm size is positive and significant, as expected, in both models. Accordingly, firm size generally increases the probability of SMEs participating in production networks. It is interesting to examine predicted probabilities of the size variable holding all other variables at their means.⁶ In the all-SMEs model (column one) the probability of an SME participating in a production network for a firm with one to 25 workers is 10 per cent, compared to 35 per cent for one that has 75 to 100 workers. This result suggests that economies of scale can be important to overcome the initial fixed costs of entering such networks. The linearity of the size effect is investigated below with a larger enterprise sample in the all-manufacturing-firms model.

TABLE 12.5: Probit estimates

Binary Variable: 1 if part of production network, 0 otherwise

	SMEs only		All firms	
	All firms in PN	Sustained exporter	All firms in PN	Sustained exporter
	All	All	All	All
	[1]	[2]	[3]	[4]
Firm size	0.012*** (0.001)	0.010*** (0.001)	0.002*** (0.000)	0.001*** (0.000)
Firm size squared			-0.000*** (0.000)	-0.000*** (0.000)
Foreign ownership	0.547*** (0.071)	0.500*** (0.081)	0.566*** (0.050)	0.533*** (0.053)
GM has primary education	0.329 (0.415)	0.070 (0.499)	0.167 (0.285)	0.131 (0.365)
GM has secondary	0.482 (0.404)	0.086 (0.487)	0.372 (0.273)	0.256 (0.351)
GM has vocational degree	0.538 (0.407)	0.156 (0.491)	0.516* (0.276)	0.387 (0.354)
GM has college degree	0.515 (0.403)	0.159 (0.484)	0.595** (0.272)	0.564 (0.349)
GM's experience	0.003 (0.003)	0.007** (0.003)	0.003 (0.002)	0.005** (0.002)
Workers have HS education	0.255*** (0.059)	0.162** (0.071)	0.181*** (0.045)	0.053 (0.050)
Firm uses foreign licenses	0.196*** (0.073)	0.093 (0.087)	0.169*** (0.055)	0.027 (0.061)
Firm is ISO certified	0.311*** (0.071)	0.144* (0.084)	0.403*** (0.049)	0.100* (0.053)
Firm has registered patents	0.218*** (0.073)	0.055 (0.090)	0.331*** (0.056)	0.063 (0.062)
Access to credit	0.094* (0.054)	-0.005 (0.066)	0.141*** (0.042)	0.045 (0.046)
Firm Age	-0.004* (0.003)	-0.011*** (0.003)	-0.004* (0.002)	-0.009*** (0.002)

Can SMEs participate in global production networks?

	SMEs only		All firms	
	All firms in PN	Sustained exporter	All firms in PN	Sustained exporter
	All	All	All	All
	[1]	[2]	[3]	[4]
Philippines	0.260** (0.110)	0.143 (0.126)	-0.201** (0.080)	-0.166* (0.085)
Indonesia	-0.130 (0.117)	-0.322** (0.143)	-0.399*** (0.082)	-0.391*** (0.091)
Viet Nam	0.425*** (0.112)	0.060 (0.133)	0.156* (0.080)	-0.099 (0.087)
Malaysia	0.841*** (0.094)	0.526*** (0.107)	0.634*** (0.068)	0.452*** (0.070)
Pseudo-R-squared	0.205	0.146	0.267	0.178
N	3,903	3,903	5,641	5,641

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Robust standard errors in parentheses

Thailand was used as reference.

All firms in PN 1 if more than 0 % of sales are exported (directly or indirectly); 0 otherwise

Sustained exporter 1 if more than 40 % of sales are directly exported; 0 otherwise

Source: Author's calculations.

The foreign ownership variable has a positive and significant effect on the probability of SME participation in production networks in both models. Having any proportion of foreign equity corresponds to a 31 per cent probability of an SME joining a production network in the all-SMEs model one (column one). This is double the 15 per cent figure for a wholly-domestically-owned SME. Access to the superior marketing connections and know-how of parents enables direct and indirect exporting by SMEs. Furthermore, access to parents' accumulated learning experience of export production as well as access to sophisticated technologies and management experience improves technical efficiency in SMEs.

The coefficient on workers high school education is positive and significant in both models. Having a high school-educated workforce increases the probability of an SME joining a production network from 14 per cent to 21 per cent in the all-SMEs model one. Furthermore, the CEO's experience is positive and significant in the

sustained-SME-exporters model. These results suggest that higher levels of human capital, particularly literate secondary-level educated workers and experienced CEOs, increase the probability of SME participation in production networks.

The coefficient on internationally agreed quality certification is positive and significant in both models. Having an internationally agreed quality certificate like ISO increases the probability of an SME joining a production network from 16 per cent to 25 per cent in the all-SMEs model one. In addition, foreign licenses and registered patents are significant with the correct sign in the all-SMEs model. Accordingly, SMEs which have acquired higher levels of technological capabilities are more likely to succeed in production networks.⁷ This requires SMEs to undertake conscious investments in skills and information to operate imported technologies rather than simply learning by doing. Capability building in SMEs involves a range of technological activities including actively acquiring new technologies through foreign licenses, implementing international quality standards and developing new products supported by patent protection.

The firm age variable is negative and significant in both models, thereby rejecting the hypothesized positive sign. While age may be a proxy for many influences, this result suggests that younger firms are likely to be more nimble in learning new market and technological information and more flexible in combining internal and external knowledge in an efficient manner. Both of these traits are likely to facilitate younger firms joining production networks.

Access to commercial bank credit is positive and significant in the all-SMEs model. This suggests that, in the presence of capital market imperfections, well-organized SMEs with collateral and an established record with commercial banks are more likely to join production networks.

The significance of the coefficients on the country dummies suggests that some differences exist between the ASEAN countries. Malaysia is significant in both models. With opposite signs, Viet Nam is significant in the SMEs model, while Indonesia is significant the sustained-exporter model.

Turning to the two all-manufacturing-firms models (columns three and four), the all-firms-in-production-networks model is likewise a better fit to the outcome data than the sustained-exporters model. The two all-manufacturing-firms models provide a somewhat better fit than the two SME models (compare the R² in columns three and four with columns one and two). Interestingly, several variables (firm size, foreign

ownership, workers high school education, international quality certification and firm age) turn out as significant with the correct sign in both all-manufacturing-firm models. Hence, the key determinants of firm-level participation in production networks are remarkably stable across the four models, suggesting that the pattern for SMEs broadly holds for all manufacturing firms.

There are also some differences between the all-manufacturing-firms models and the SME models. Adding a size-squared variable in the all-manufacturing-firms model was useful in clarifying the size effect. The coefficient on size-squared is negative and significant, implying a non-linear relationship. It seems that economies of scale and fixed costs are important in the early stages of joining production networks but less relevant over time as SMEs become important players in their own niche markets or form industrial clusters. Furthermore, the CEO's characteristics are more pronounced in the all-firms-in-production-networks model (column three) with significant coefficients for college degrees and vocational education. Higher levels of CEO education are clearly required for more complex, scale economy-intensive operations associated with firm size in production networks. Finally, country characteristics matter but differ between the all-manufacturing-firm models with all four country dummies significant in the all-firms-in-production-networks model, but only two in the sustained-exporter model.

12.6. Exploring selected policy influences

The overall business environment in ASEAN economies is an important influence on SME participation in production networks. A myriad of reform policies, factor markets and targeted SME policies are involved. These range from trade policies and customs regulations, business start-up regulations, export promotion initiatives, special financing schemes, to technology support measures.⁸ It is hard to portray the overall business environment for SMEs in ASEAN economies and disentangle the different effects on firms. One practical method is to use available data on enterprise perceptions to examine the supportive nature of the policy regime facing SMEs in their quest to participate in production networks.

Table 12.6 lists the main obstacles to conducting business in the ASEAN economies identified by the SMEs using information from the World Bank's Enterprise Surveys. These are grouped under three headings: incentive framework, supply-side factors and other. The discussion below highlights SMEs' views of major obstacles facing them for all ASEAN economies and for individual economies. The data for Thailand

should be interpreted with caution as the survey was conducted in 2008 during a period of political turbulence and uncertainty.

Contrary to expectations, the leading obstacle facing SMEs in all ASEAN economies falls under the heading of “other” and relates to the practices of competitors in the informal sector. Cited by 38.9 per cent of all SMEs in ASEAN economies, such practices refer to a variety of negative activities including smuggling of goods and inputs, price fixing and other anti-competitive practices, and poaching of skilled workers. A high

TABLE 12.6: Perceived major or severe obstacles to conducting business, SME firms (per cent of SME firms)

	All countries	Malaysia	Thailand	Philippines	Indonesia	Viet Nam
Incentives						
Tax rates	31.9	31.1	54.8	42.9	14.3	16.5
Tax administration	26.7	24.0	49.6	34.2	13.3	12.4
Customs and trade regulations	20.0	20.1	41.0	18.0	12.5	8.7
Business licensing and permits	16.7	16.4	25.4	22.1	16.5	2.8
Political instability/ economic uncertainty	34.7	28.8	84.0	28.9	29.5	2.3
Supply side						
Transport	23.8	11.3	33.6	26.5	23.2	24.2
Electricity	29.6	17.9	42.4	30.6	30.2	26.7
Telecommunication	10.4	9.3	24.5	7.6	6.6	3.8
Access to finance/credit	34.6	22.1	44.3	28.5	38.6	39.4
Inadequately-educated labor force	28.0	24.1	60.2	16.8	15.4	23.7
Labor regulations	17.4	17.2	35.2	15.5	11.3	8.0
Access to land	16.0	11.1	11.7	9.6	19.2	28.3
Other						
Crime, theft and disorder	24.5	25.3	53.7	16.5	21.4	5.8
Corruption	30.1	20.6	59.7	37.4	23.4	9.5
Practices of competitors in informal sector	38.6	20.7	55.9	44.5	36.6	35.3

Source: Author's calculations.

degree of trust among firms is increasingly regarded by MNCs as a critical ingredient for developing market-led production networks. Among other things, high levels of trust encourages positive collective behaviour among firms – such as sharing of sensitive information, pooling of technical knowledge and joint production and marketing activities – which is critical in technologically intense, efficient production networks. However, the data are suggestive of a general “trust deficit” among SMEs in ASEAN economies which impedes the development of production networks with greater SME involvement. Interestingly, Malaysian SMEs (20.7 per cent) seem to view the practices of competitors much less seriously than the other ASEAN economies suggesting that higher levels of trust exist among its enterprises.

A variety of supply-side factors are viewed as an obstacle by SMEs. The usual constraint in most studies of SMEs – access to finance (34.6 per cent) – follows closely as the second most important obstacle in ASEAN economies. This issue seems least severe in Malaysia (22.1 per cent) and most severe in Viet Nam (39.4 per cent) and Indonesia (38.6 per cent). Both the high cost of borrowing and the availability of financing from commercial banks fall under this heading. Inter-country differences in access to finance partly reflect the influence of monetary policies and the development of capital markets. A lack of financing is a deterrent to some firms investing in new equipment, technologies and marketing methods which are needed to participate in production networks.

Bottlenecks pertaining to physical infrastructure and worker skills also show up as impediments to SMEs joining production networks in ASEAN economies. Electricity costs (and some fluctuations in supply) were cited by 29.6 per cent of SMEs in all ASEAN economies and the quality of transport systems (roads, rail and ports) by another 23.8 per cent. High electricity costs and the quality of transport systems appear to be less of a problem in energy producers such as Malaysia and Indonesia than in the three energy importers. Relative infrastructure gaps in energy-importing ASEAN economies was reflected in poorer connectivity and higher trade costs compared with energy producing economies.

An inadequately educated labour force was mentioned as a problem by 28 per cent of SMEs in all ASEAN economies, but Thailand, Malaysia and Viet Nam report higher figures than the other economies. This pattern may reflect skill shortages and rising wage costs in part associated with moves in the direction of full employment. Amidst a tightening labour market, labour regulations were perceived to be more of a problem for SMEs in Malaysia and Thailand than in the other ASEAN economies.

In contrast, access to land is generally not seen as an obstacle, with only 16 per cent of SMEs in all ASEAN economies highlighting this issue. Within this overall picture, however, SMEs in Viet Nam (28.3 per cent) may have some concerns in relation to access to land.

On the policy and incentive front, regulatory issues at the border seem to be a limited concern. For instance, only 20 per cent of SMEs in all ASEAN economies cited customs and trade regulations as a concern. This may reflect the fact that tariffs are quite low in ASEAN economies and that customs administration has been improved due to decades of gradual trade reforms. Thailand may be somewhat of an outlier, and the issue may relate to customs administration rather than trade regulations *per se*. Thus, customs and trade regulations generally do not seem to be an important impediment to SMEs participating in production networks.

There are mixed views about some behind-the-border regulatory issues. Business licensing and permits are not a widespread problem in ASEAN economies, with only 16.7 per cent of firms pointing to this issue. Meanwhile, tax policy issues do matter. In this vein, high corporate tax rates were cited by 31.9 per cent of SMEs and gaps in tax administration by another 26.7 per cent. Tax policy issues directly affect enterprise profitability and the incentive to participate in production networks. These issues appear to be a particular concern in Philippines and Thailand and, to a lesser extent, in Malaysia.

According to 34.7 per cent of SMEs in all ASEAN economies economic uncertainty is also a notable impediment. However, a closer look at the data indicates that this figure is partly attributed to Thailand (84 per cent) being an outlier for an unusually long period of domestic political turbulence. With the exception of Viet Nam (2.3 per cent), some concerns about economic uncertainty were also expressed in the other ASEAN economies.

Finally, corruption was mentioned by 30.1 per cent of SMEs in all ASEAN economies and crime, theft, and disorder by another 24.5 per cent, indicating that these are significant issues for SMEs.

Thus far, the availability of enterprise-level data on the five ASEAN economies has limited further exploration of supply-side factors influencing SME participation in production networks. The important area of business services markets and business service providers for SMEs has not been discussed. Fortunately, some data for

Malaysia and Thailand only on SMEs' ranking of the affordability and quality of business services in the country was obtained from the World Bank's Enterprise Surveys. This is provided in Table 12.7 for six kinds of business services.

The main findings are as follows:

- On average, Malaysia seems to have more affordable and higher-quality business services than Thailand. Thus, 69.4 per cent of SMEs in Malaysia said that business services were affordable, compared with only 42.6 per cent in Thailand. Likewise, the quality of business services in Malaysia was ranked at 3.2 and that in Thailand at 2.8 (where 4 is very good)
- Looking at individual services, there is little variation in the good quality of individual business services in Malaysia. But technology services (engineering and design services as well as IT services) are somewhat less affordable compared with other services
- Meanwhile, Thailand shows notable variation in terms of affordability and quality of business services. Strikingly, engineering and design (15.4 per cent), management and marketing (8.4 per cent), and IT services (31.2 per cent) are considered less affordable than other business services. In terms of service quality, marketing and management services (2.6 per cent) are rated lower than other business services

TABLE 12.7: SME firms' perception of business and support services

Quality of business services available in their country (1 = very poor; 4=very good)

	Malaysia		Thailand	
	Affordable	Quality score	Affordable	Quality score
<i>Business services available in the country – quality (average)</i>	69.40%	3.2	42.60%	2.8
Engineering and design	57.40%	3.1	15.40%	2.8
Management and marketing	69.80%	3.1	8.40%	2.6
Accounting	81.90%	3.3	84.20%	3.0
Legal services	69.30%	3.1	35.10%	2.8
Insurance	78.60%	3.2	81.20%	3.0
IT services	59.40%	3.1	31.20%	2.8

Source: Author's calculations.

12.7. Conclusions and policy implications

This paper examined factors affecting SME participation in global production networks in five ASEAN economies through a firm-level econometric exercise and descriptive analysis of policy influences. The research was based on a large World Bank multi-country enterprise data set.

Our research suggests that large firms are the leading players in production networks in ASEAN economies in the late 2000s while SMEs are relatively minor. Nonetheless, the available information also hints at a modest increase in the participation of SMEs in ASEAN economies between the late 1990s and the late 2000s as measured by the share of SME exports. More developed ASEAN economies such as Malaysia and Thailand, which are more established in production networks, have higher SME export shares than other ASEAN economies.

The outcome of the econometric exercise underscores the notion of firm heterogeneity in relation to firm-level participation in production networks. The results suggest that size, foreign ownership, educated workers, experienced CEOs, building technological capabilities and access to commercial bank credit all positively affect the probability of SME participation in production networks. By contrast, age has a negative relationship.

The exploration of policy influences on SME business activity provides additional insights. A trust deficit seems to hamper the requisite intra-firm cooperation needed for effective SME participation in production networks. Supply-side factors – like lack of access to finance, high electricity costs, variable quality of transport systems and inadequately educated workers – are an additional hindrance to SMEs. On the policy and incentive side, behind-the-border issues such as high corporate tax rates as well as economic uncertainty also play their part. Finally, the limited evidence from Malaysia and Thailand suggests that the affordability and quality of business support services are an issue. Tackling these constraints at firm and country level would help to unleash the full potential of SMEs as players in production networks in the future.

Thus, our results suggest that exploration of SME participation in production networks is important as ASEAN economies further deepen their engagement with production networks and supply chains as a part of rebalancing. It also indicates that improving the quality of published data on SMEs in ASEAN economies and further empirical

research into this area would be fruitful. Some limitations in the methodology employed in this paper may be addressed in future research. First, several factors that may also affect the participation of SMEs in production networks (such as trade policies, domestic regulations, infrastructure and business support services) were considered in the descriptive part but not in the econometric exercise. Attempting to include such factors in future econometric work may provide additional insights. Second, the production network functions estimated are static as only cross-section data were available. Third, the research was unable to examine the issue of FDI by ASEAN SMEs due to data gaps. Thus, the findings need to be interpreted with caution. Panel data analysis would be invaluable to highlight changes over time when the requisite data are available.

Endnotes

- 1** The vision of ASEAN leaders builds on the Strategic Action Plan for ASEAN SME Development 2010–2015 which covers mandates stipulated in the ASEAN Economic Community (AEC) Blueprint. The major deliverables under the plan are: (i) a common curriculum for entrepreneurship in ASEAN, (ii) a comprehensive SME service centre with regional and subregional linkages in ASEAN economies, (iii) an SME financing facility in each ASEAN economy, (iv) a regional program of internship schemes for staff exchanges and visits for skills training, and (v) regional SME development funding for supporting intra-ASEAN business leaders.
- 2** Harvie and Lee (2002) provide a reasonably reliable snapshot for the late-1990s showing that on average SMEs made up 91.8 per cent of enterprises and 50.5 per cent of employment in ASEAN economies. But their average export share is only 14.3 per cent (estimated from Harvie and Lee 2002, Table 1.2, p. 6).
- 3** For further discussion of resource constraints and external barriers faced by SMEs as well as appropriate policy interventions see Levy et al., (1999); and Hallberg (2000).
- 4** For instance, in Malaysia SMEs are defined by sales, employment and type of industry. In Indonesia, different government agencies seem to have different definitions of what constitutes an SME.
- 5** This means that all population units are grouped within a homogenous group and simple random samples are selected within each group. This method allows computing estimates for each of the strata with a specific level of precision while population estimates can also be estimated by properly weighting individual observations. The strata for enterprise surveys are firm size, business sector and geographic region within a country. In most developing countries, small and medium-sized enterprises form the bulk of the enterprises. Large firms are oversampled in the firm surveys as they tend to be engines of job creation. For more details of the sampling methodology see www.enterprisesurveys.org/methodology.
- 6** The same assumption is made for all the probabilities given in the text. A complete set of results on predicted probabilities is available on request.

7 Wignaraja et al., (2013) further explore this insight for a sample of Malaysian and Thai firms using a technology index (consisting of eight technical functions) based on the taxonomy of technological capabilities developed by Lall (1992). The results show that participation in production networks is positively correlated with technology upgrading at firm-level.

8 It is recognized that the developing industrial clusters involving SMEs and large firms are also an important means to promote SME entry into production networks. However, a lack of data on this aspect meant that clustering and cluster promotion could not be examined in this paper (Fischer and Reuber, 2003).

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Appendix

TABLE 12.8: Selected studies on determinants of decision to export and participation in production networks in ASEAN

Studies	Country	Sample	Estimation	Dependent variable	Results
Determinants of decision to export					
Van Dijk (2002)	Indonesia	20,161 industrial plants (1995 survey data)	Tobit and Papke and Woolridge technique	Export value as share of sales (0 to 1)	Firm size (U-shaped), foreign ownership (+), age (-), human capital (+), R&D (+)
Rasiah (2004)	Malaysia, Thailand, Philippines	98 firms; all exporters	OLS	Logarithm of export value	Foreign ownership (+), process innovation (+), wage (+), network cohesion (+)
Dueñas-Caparaz (2006)	Philippines	505 food, clothing, and electronic firms (2002 survey data)	Logit and Papke and Woolridge technique (3 sector models)	Export value as share of sales (0 to 1)	Food: Skilled workers/total workers (+), foreign affiliation (+) Clothing: employment size of firm/total size of sector (+), age (+), foreign affiliation (+), R&D/sales (-)
Nguyen, Nishijima (2009)	Viet Nam	1,150 firms (2004 data)	2-step efficient generalized method of moments (2SGMM-IV), limited information maximum likelihood estimator (LIML), instrumental variables tobit (IV-TOBIT)	Export value as share of sales (0 to 1)	Electronics: R&D/sales (+), training (+), foreign affiliation (+), capital stock/labor cost (+) 2SGMM-IV: Value added per employee (+), input importer (+), firm size (+), capital intensity (+), foreign owned (+), competition intensity (+) LIML:

Studies	Country	Sample	Estimation	Dependent variable	Results
Wignaraja (2011)	PRC, Thailand, Philippines	784 electronics firms (524 from PRC, 166 from Thailand, 94 from the Philippines)	Probit (3 country models)	Exporter (1=Yes, 0=No)	Value added per employee (+), input importer (+), firm size (+), capital intensity (+), foreign owned (+), competition intensity (+) IV-TOBIT: Value added per employee (+), input importer (+), firm size (+), capital intensity (+), website use (+), foreign owned (+), competition intensity (+) Thai model: Technology Index (+), foreign ownership (+), age (+), Philippine model: Technology Index (+), foreign ownership (+), size (+), age (-), value of machinery and equipment per employee (+)
Determinants of participation in production networks by SMEs					
Harvie, Nargoko, Oum (2010)	Thailand, Indonesia, Malaysia, Philippines, Viet Nam, Cambodia, Lao PDR	912 firms; 780 SMEs from multiple sectors	Probit (13 models)	Participation in Production Network (1=Yes, 0=No)	Labour productivity (+), Foreign ownership (+), Interest Coverage (+), dummies for technology, business networks, technological capacity, innovation (all +), Country group (old ASEAN members): Malaysia, Thailand, Indonesia, Philippines (+)
Kyophilavong (2010)	Lao PDR	151 firms from multiple sectors	Logit	Participation in Production Network (1=Yes, 0=No)	Tertiary education (+), Met an international standard (+), established new divisions or plants (+), Production and price barriers (-)
Rasihah, Rosli, Sanjivee (2010)	Malaysia	103 firms from multiple sectors	Probit (3 models)	Production Network participation (1=Yes, 0=No)	Value added/worker (+), Size (+), X/Y (+)

Source: Author's compilation.

TABLE 12.9: Correlation Matrix

	exporter	size	size2	fordum	gmeduc	gmexp	labordum	forlicense	iso	patent	credit	age
exporter	1											
size	0.3032	1										
size2	0.0914	0.7780	1									
fordum	0.3414	0.2157	0.0800	1								
gmeduc	0.2085	0.1726	0.0360	0.2129	1							
gmexp	-0.0247	0.0595	0.0241	-0.0801	0.0041	1						
labordum	0.2737	0.1113	0.0196	0.2432	0.1436	-0.0941	1					
forlicense	0.3155	0.2012	0.0781	0.4380	0.1225	-0.1275	0.3630	1				
iso	0.3584	0.3179	0.1080	0.3086	0.2730	0.0301	0.2187	0.2889	1			
patent	0.1006	0.0717	0.0118	0.0277	0.1219	0.0493	0.0810	0.0668	0.1321	1		
credit	0.1810	0.1365	0.0341	0.0719	0.1110	0.0057	0.1578	0.1899	0.1646	-0.0011	1	
age	0.0437	0.1111	0.0351	-0.0509	0.0271	0.3415	0.0805	0.0261	0.0981	0.1564	0.0069	1

Source: Author's calculations.

13 The globalization of supply chains – policy challenges for developing countries

Ujal Singh Bhatia

13.1. Introduction

Global Value Chains (GVCs) represent the dominant form of cross-border economic organization for the production and delivery of goods and services, and developing countries have to deal with them to maintain and enhance their participation in the global economy. While GVCs are the product of the significant changes that have taken place in the global economy over the last three decades and market forces largely determine their scope and direction, governments still have an important role to play in influencing the nature and terms of participation of their firms. The ongoing expansion of trade in services has added a significant new dimension to GVCs and offers another avenue for developing countries to grow their economies. This paper looks at policy challenges and opportunities that global and regional value chains raise for developing countries and argues that proactive policy measures can improve outcomes for these countries. However, GVCs pose particular problems for small, poor countries with weak governance structures to maintain and improve their participation in the global trading system. GVCs require a robust multilateral rule-making process in order to enhance their economic and political sustainability.

The paper is organized in the following manner: the first part deals with the key issues involved for developing countries to integrate GVCs into their policy frameworks; the second deals with some key developments in GVCs, especially in the context of the current economic crisis; and the third with the increasing role that global services networks are playing in the global trading system. The fourth part looks at how some industry sectors in India and South Asia have fared in their interaction with GVCs. The concluding part draws some policy conclusions, including on the issue of rule-making for GVCs.

13.2. GVCs and governments

Two aspects of economic globalization have a particularly significant bearing on the economic crisis and its resolution: the integration of global financial markets and the geographical fragmentation of manufacturing and services. Both aspects have deeply influenced recent changes in the composition and direction of global trade flows. While the post-crisis efforts of world leaders (most notably the G-20) have largely focused on the first aspect, the second has elicited inadequate policy attention until recently. The new interest of researchers and policymakers in the study of GVCs and the use of the GVC framework as a policy tool is therefore a positive development. Essentially, the GVC framework focuses on how value is created within the GVC and how it is distributed among the participant firms and countries. Empirical studies of GVCs also demonstrate how firms and countries have been able to improve outcomes for themselves in terms of the value captured and the employment generated, as well as the role that government policies play in such outcomes.

GVCs are the outcome of the unprecedented integration of factor and product markets around the world in response to the political and technological changes that have taken place in recent years promoting economic openness and facilitating easier communication and delivery of goods and services. The fundamental rationale for value chains is economic efficiency and competitive advantage, based on transaction cost minimizing behaviour of firms. Lead firms within value chains, whether such value chains are producer driven or buyer driven, weigh the risks of offshoring or outsourcing their production in various locations and countries against the cost advantages. Such decisions are continuously re-evaluated in the light of changing consumer preferences, technological changes, geographical shifts in demand, competitive conditions and locational risks.

However, governments can be expected to view value chains from a different perspective that encompasses economic, political and strategic factors. Thus, while most policymakers would generally view domestic value chains in positive terms as reflecting a move towards greater economic efficiency and regional value chains as involving economic and strategic benefits, their approach to extra-regional supply chains with a wider dispersal of value would tend to factor in other issues, such as systemic risk arising from exogenous shocks, policy objectives of developing national capacities in a range of industries and maximizing employment opportunities. In countries where food security concerns are important policy preoccupations, governments would tend to look at agro-food GVCs differently from participant firms.

Policymakers can also be expected to view the issue of “upgradation” within the value chain from a perspective which is often different from that of participant firms. From the viewpoint of firms, moving up the chain usually has positive connotations, yet there can be a number of situations where they would feel more secure within their niches in the value chain. Economic “downgrading” is often used by firms as a business strategy.¹ Conversely, upgrading often involves higher technology that is usually labour saving. In brief, while firms participating in GVCs would approach the issue of upgrading from the perspective of economic logic, policy makers would operate across a larger canvas of capturing maximum value within the country and generating the most jobs.

The over-arching framework for policymakers is of course their national development strategies. In the post-colonial era of the 1950s, many developing countries adopted the import substitution paradigm for industrialization. The “East Asian miracle” based on the rapid growth of Japan on the one hand and the Republic of Korea; Chinese Taipei; Hong Kong, China and Singapore on the other, provided a striking counternarrative through export oriented development strategies. The remarkable success of the latter, along with the oil shocks of the 1970s which led to debt servicing problems for several countries that had embraced import substitution strategies, gradually resulted in the waning of the import substitution paradigm.² The World Bank and the International Monetary Fund pushed the transition from import substitution to more open strategies in many indebted countries. This transition was further assisted by a sharp increase in outsourcing by multinational corporations of relatively standardized activities to lower-cost production locations.³ As a result of all these factors, developing countries became more export-reliant, with exports growing to 33 per cent of GDP in 2007, compared with 15 per cent in 1980. China’s transition was even more dramatic. Its export reliance increased from three per cent of GDP in 1970 to 43 per cent in 2007.⁴ However, while there is a strong link between the emergence of GVCs and the adoption of export-oriented industrialization strategies by a large number of developing countries, it also must be borne in mind that in a number of countries such as China and India, many of the capabilities which enabled them to effectively participate in GVCs were created during their import substitution phase, elements of which are still in existence in their policy regimes.

In the present context, the discussion on GVCs and national development strategies has to move beyond the construct of import substitution versus export-oriented industrialization. It should be recognized that while the world is witnessing a phase of unprecedented economic interdependence, at the same time it is in the throes of

deep structural changes. As a consequence, industrialized economies can no longer be expected to function as the main drivers of global growth in the foreseeable future, having ceded the role to a considerable extent to the emerging economies. The consequent shift of demand to the emerging economies is bound to impact the nature and direction of GVCs. The current economic crisis has also highlighted the risks involved in export dependence and has shifted policy focus in many countries to the generation of domestic demand.

Secondly, while participation in GVCs clearly has its rewards, there is growing concern regarding the uneven distribution of the gains between countries, within countries and among participant firms. The increasing consolidation of GVCs tends to favour larger countries with more domestic demand and better infrastructure and larger firms with greater capability of scaling up. Such a trend is consistent with the economic logic of GVCs. However, this “process of unequalization”⁵ has implications for the political sustainability of globalization. It is therefore clearly relevant for policymakers at the national level to look at policy options that seek to improve outcomes for firms and workers in terms of incomes and employment. At the same time, it should be recognized that any economic activity carries with it risks of unequal benefits. The question for policymakers is to consider whether such risks emerging from GVCs are greater than in the case of counterfactual scenarios and whether they can be mitigated through appropriate policy instruments.

A third issue relates to the risk of transmission of exogenous shocks by GVCs. Critics of GVCs point to the speed with which the demand fallout of the current economic crisis has impacted developing country participants in GVCs, to argue against untrammelled exposure to GVCs and for risk mitigation measures. The 2008–09 downturn “resulted not only in larger declines in trade than had occurred previously but also declines that were more rapid”.⁶ While robust domestic demand can provide a cushion against such shocks, that avenue is not open to all economies, especially for countries with small domestic markets.

At a broader level, given their significant role in the global trading system, GVCs raise issues of international governance and rule making. Within GVCs, the rules are usually set by lead firms based on their requirements. The proliferation of product- and process-related private standards is an example of the exercise of this power. Such “private rules” can act as market entry barriers, especially where the lead firms imposing them have large market power. The antidote for this can only be a multilateral rule-making process that is in tune with market realities. It is often argued that in the

absence of such a process, the new generation of deep RTAs is filling the breach. However, given the often-asymmetrical distribution of power between RTA members, it can be argued with equal conviction that rule making in such RTAs is susceptible to the same problems as witnessed in GVCs.

To summarize, policy formulation exercises to integrate GVCs into the national development strategies of developing countries must contend with a global economy in the throes of deep structural change. The shifts in the centres of final demand will have obvious implications for the nature, scope and governance of GVCs. The economic downturn in industrialized countries combined with robust growth in emerging economies is leading to consolidation of GVCs with a sharp reduction in the number of suppliers and changes in the pattern of value distribution within GVCs. These changes tend to favour larger, more capable suppliers in emerging economies. The significant role being played by GVCs in the global trading system also has implications for multilateral rule making.

13.3. Consolidation, value distribution, market shifts and participation

Milberg and Winkler distinguish between two types of consolidation of value chains – vertical and horizontal. The former relates to a reduction in the number of tiers in the value chain and the latter to the number of suppliers in a tier. It is logical to expect both types of consolidation in a downturn, but the real issue is its reversibility when demand rebounds. While there is broad evidence of consolidation across GVCs as a result of the present economic crisis, the bulk of this is occurring in buyer-led chains where relationships between buyer firms and suppliers are typically more short-term. Producer driven chains, which usually involve deeper relationships including technology sharing between lead firms and suppliers, have been less affected. These conclusions are borne out across a number of industries. The global apparel industry has undergone deep restructuring in recent years, first as a result of the WTO-driven phase-out of the quota regime in 2005 and now also due to the current economic downturn in major markets. As a result, a large number of marginal players (both countries and firms) have been edged out and buyers now prefer to work with “fewer, larger and more capable suppliers”.⁷ In the automobile industry, the economic crisis has accelerated the shift of demand and capacity towards emerging markets in large developing countries.⁸ The response of the electronics industry to the economic crisis highlights the strong role of deep supplier capabilities among contract manufacturers and platform leaders.⁹

At the same time, given the history of dynamic change in the industry, incumbents cannot take their positions for granted and the structure and direction of electronics GVCs is bound to change in line with increasing capabilities and demand in emerging economies. The issue of reversibility of consolidation depends on a number of factors – the speed of recovery, the ability of surviving suppliers to expand capacity and capture scale economies and the entry barriers such capabilities would create for prospective entrants. Overall, the more capable survivors are, the more they are in a better position to expand when the market recovers.¹⁰ In general, much of the ongoing consolidation can be expected to be irreversible in the medium term.

The frequently cited examples of value distribution in Apple's Ipod¹¹ and Nokia's N95 phone provide good illustrations of the low share of offshored manufacturing in the total value added in a product. Although the Ipod and N95 are mostly made in Asia, most of the value accrues in the United States and Europe, respectively. The “smile curve” provides graphic illustration of the same phenomenon – the bulk of the value capture of a product developed and owned by a lead firm takes place in the preproduction (product concept, design, R&D) and postproduction (sales and marketing, after sales) stages.¹² This has clear lessons for industrial policy in developing countries. It is no longer enough to focus on manufacturing; it is essential for policy makers to look at all stages of the value chain in order to maximize income and employment outcomes. This calls for an integration of policies for manufacturing, services, investment, innovation and intellectual property in the larger trade policy regime.

It is almost axiomatic to contend that the “nature of final markets”¹³ plays a determinative role in economic growth. Some observers have speculated that the shift of markets away from the North could have negative implications for low-income economies participating in GVCs. They argue that the shift could entail a move from differentiated products to commodities, with less emphasis on quality, both in products and processes, environmental aspects and standards. Given the lesser complementarity in the economies of the emerging-economy buyers and the low-income economy suppliers, there would be greater competition in the division of labour within GVCs. This could put the low-income economies at a disadvantage in their efforts to move up the value chain.

However, these apprehensions remain largely untested against empirical evidence of shifts in GVCs that provide differentiated products to northern markets.¹⁴ As far as food and agricultural products especially are concerned, value added in low-income economies supplying their products to northern markets has been

frequently constrained by the significant tariff escalation in the tariff structures of the northern markets as well as by other non-tariff barriers. The issue of standards is more complex. It can be argued that the proliferation of private standards in northern economies often has as much to do with the lead firms in buyer-driven GVCs seeking to add more value to their products through differentiation as it does with consumer preferences. There is evidence to suggest that “the value generated by the standard tends to be captured by downstream market operators, in particular large-scale retailers, and only a small share of it accrues to producers”.¹⁵ Regarding environmental aspects, advanced economies, especially while dealing with mineral-based products, have been quite content to export their pollution to developing country suppliers by encouraging processing *in situ*. The reasoning that less complementarity between the economies of emerging markets and low-income economies will discourage value addition in the latter is also open to question. Recent reports of labour shortages and increasing labour costs in China point to the dynamic nature of comparative advantage.

Overall, there is little hard evidence to suggest that the shift of markets away from the North would have a negative impact on the participation of low-income economies in GVCs. On the other hand, the increase in demand in emerging markets has helped to maintain or even enhance the incomes of low-income economy participants. Still, similar risks emerging from the consolidation in GVCs are real and well documented.

13.4. Globalization of services

Development theory has traditionally associated economic development with the expansion of manufacturing. However, the rapid growth in services trade in recent years has provided another additional opportunity for developing countries. Changes in communication technology have revolutionized the way services are organized and delivered. The technological advances that have led to the unbundling of services have created new opportunities for specialization and for the entry of newcomers into the value chain. An added advantage for the tradability of many modern services is that they are traded digitally and are therefore not subject to many of the trade barriers that typically affect merchandise trade. Based on the available evidence, it would be fair to say that the enormous expansion of trade in “modern” services in the last two decades demonstrates that we are now witnessing the emergence of a new paradigm for development that accords equal importance to services as a growth accelerator.

The importance of services growth for developing countries can be gauged from the following indicators.

- In the last three decades, services have contributed more to total global growth than industry. Developing countries outperformed developed countries in growth of services exports, and their services exports grew faster than their goods exports
- In roughly the same period, the services sector led to rapid job creation in developed and developing countries, while industry and agriculture shed jobs
- The rise in the contribution of services to employment is associated with labour productivity growth. This implies that the global technology frontier for services is expanding
- The product mix of services exported by developing countries is changing with higher growth in modern services as compared to traditional services like tourism¹⁶
- There is good evidence to suggest that the sophistication of services exports is positively related to growth¹⁷ and that entry barriers to services exports are not too strongly related to the economic sophistication of the exporting country (as measured by per capita income)¹⁸
- Cross-country evidence from some 50 developing countries suggests that growth in the service sector is more correlated to poverty reduction than growth in manufacturing¹⁹

Given that the globalization of services is still far from achieving its potential, services-led growth strategies can potentially yield rich dividends for developing countries. Delivery through supply chains is intrinsic to the unbundling of services and the services economy can only grow through the vehicle of supply chains. An examination of the development implications of the rapidly increasing trade in services is therefore an important dimension of the policy debate on GVCs.

13.5. South Asia and GVCs – experience of some key sectors

Services

Services have led the growth process in South Asia in recent years and have enabled the region to match the high growth rates in East Asia. Labour productivity in services

has expanded faster than in industry, and productivity growth in services in South Asia matches productivity growth in manufacturing in East Asia. This has helped the region to reduce poverty levels.²⁰

Within the impressive growth of the services trade in South Asia, the performance of India's information technology business process outsourcing (IT-BPO) industry has been remarkable. During fiscal year 2012, despite the global slowdown, Indian industry is expected to achieve aggregate revenues of over US\$ 100 billion, including exports of US\$ 69 billion. Of this, IT software and services revenue is expected to reach US\$ 88 billion, reflecting growth of around 15 per cent over the previous year. Despite the controversies around offshoring, India was able to increase its share of the global sourcing industry from 51 per cent in 2009 to 58 per cent in 2011. Reflecting the growing sophistication and diversity of the Indian industry, engineering and R&D services, and software products constitute one fifth of its total software and services exports. The industry expects to add 230,000 jobs in fiscal year 2012, thus providing direct employment to about 2.8 million people and indirectly employing 8.9 million. The industry's revenues now comprise around 7.5 per cent of India's GDP compared to 1.2 per cent in 1998. Over the same period, its contribution to total Indian exports (merchandise plus services) increased from less than four per cent to about 25 per cent.²¹

The performance of India's IT-BPO industry enables it to provide positive responses to several questions that policymakers concerned with GVCs would tend to ask. India's participation in GVCs is creating jobs and augmenting incomes, thus helping to reduce poverty; it is moving up the value chain and scaling up to remain competitive; it is diversifying its markets in response to changing conditions; and it has been able to hold its own and even increase market share in the global sourcing industry during the economic crisis.

A number of factors have enabled India to take advantage of global opportunities to build its IT services industry. These include positive policies which have enabled its industry to take advantage of openness in key markets, high-quality telecom facilities including broadband, innovative programmes such as the government's Software Technology Parks initiative in 1991. This initiative created the base for IT start-ups and high-quality tertiary education through institutions like the Indian Institutes of Technology that helped foster a large pool of highly skilled IT workers. A growing domestic economy needing IT solutions to enhance productivity has been another positive factor.

The Indian automotive industry

The Indian automotive industry provides an illustration of how government policies can leverage domestic market advantages to improve the bargaining power of local firms and thus influence value distribution in a GVC. Initially, the industry developed under tightly controlled policy conditions. The Auto Components Licensing Policy of 1997 provided four requirements to be fulfilled by investors: establishment of production facilities, minimum foreign equity of US\$ 50 million, a phased programme of indigenization and broad foreign exchange balancing over a defined period. The United States and the EU filed a complaint with the WTO, which was upheld, against the local content and indigenization requirements. However, India's policy along with a high tariff regime contributed to its success in attracting the global automobile majors to set up production facilities in India. In fiscal year 2011, the industry produced over 20 million vehicles, including over two million passenger cars, with a turnover of US\$ 58.58 billion. About 2.9 million vehicles were exported including over half a million passenger cars.²² Similarly, the auto components sector has witnessed rapid growth. In fiscal year 2011, the industry had a turnover of US\$ 43.5 keep together billion including exports of US\$ 6.8 billion. Some 59 per cent of the exports went to the United States and Europe.²³

A mix of factors has enabled Indian automotive firms to straddle the value chains at all levels: high protection walls, policies that incentivize local production, a large and growing domestic market, a reservoir of skilled labour and strong IT skills. India's strengths in IT-enabled design have helped Indian firms move into this area.²⁴ These factors have also strengthened the bargaining position of Indian firms with the lead firms in the automotive GVC. The acquisition of foreign automobile brands (Jaguar and Land Rover by Tata Motors, SsangYong by Mahindra) has helped Indian firms to acquire valuable know-how, especially in design and development.²⁵

The South Asian apparel industry

The GVC for apparel has witnessed fairly tumultuous times over the last decade leading to significant changes in the participation of countries and firms. The consolidation engendered by the Multi Fibre Arrangement's phase-out has been intensified by the effects of the ongoing economic crisis. The skewed nature of global demand (in 2008, the EU, the United States, Japan, and the Russian Federation accounted for about 82 per cent of world apparel imports) has contributed to changes in the scope, participation and direction of the apparel GVC²⁶ due to intensified competition for the

reduced demand. Power equations between the various actors in the GVC (brand owners, retailers, purchasing agents and suppliers) have changed to the detriment of suppliers. The shakeout among suppliers has led to changes in the way the survivors deal with the lead firms with greater emphasis on long-term relationships, scale and full package capabilities. The export-driven business model has come under question and there is new emphasis on domestic markets.

The South Asian industry has not done too badly in the crisis, and Bangladesh has emerged as the star performer in the region. However, the economic crisis has highlighted the considerable potential efficiency gains from an integration of the textiles and clothing industry. This industry is extremely important for the region as it employs 55 million people directly and nearly 90 million indirectly. In 2007, textiles and clothing exports accounted for 80 per cent of Bangladesh's total exports. The figures for Pakistan, Sri Lanka and India were 55 per cent, 45 per cent, and 12 per cent respectively. A recent study²⁷ has pointed to the potential gains and the policy challenges that greater integration would entail. An indication of the challenges to integration is provided by the fact that, in many instances, despite the South Asian Free Trade Agreement (SAFTA), South Asian countries maintain a more restrictive trade regime with their regional trade partners than with the rest of the world, and many products being imported from the rest of the world find place in the sensitive lists for tariff concessions under SAFTA.

A similar ongoing study by UNCTAD²⁸ (called "Intra-Regional Trade in Leather and Leather Products in South Asia: Identification of Potential Regional Supply Chains") concludes that, with greater integration and removal of tariffs, intra-regional trade in leather and leather products can increase tenfold from the existing level (US\$ 63 million in 2010).

13.6. Conclusions

Global value chains are the consequence of the geographical fragmentation of manufacturing and services and require a fresh policy paradigm if they are to be leveraged for development. Global commerce involves criss-crossing networks of goods, services, finance, capital, technology, intellectual property and people. National development strategies which aim to harness globalization for development must be based on an integrated approach that recognizes the organic links between these factors and seeks to remove impediments in their flows. The value chain framework provides a good basis for such integrated policy formulation. Such a

policy framework would take developing country trade policymakers away from solely focusing on tariffs or industrial policy and towards the objective of maximizing value capture across the value chain.

The conceptual basis for value chains is economic efficiency based on transaction cost minimization, thus the foundation of an integrated policy approach must be domestic market integration. This is a task only partly accomplished in many developing countries. Effective participation in international value chains can only be built on the shoulders of efficient and well-integrated domestic markets; policy instruments such as Special Economic Zones can only be a partial, suboptimal panacea.

Regional value chains are a natural bridge between domestic and global value chains. They serve to expand markets and enhance scalability. Politically, they are an easier bridge to cross and successful regional value chains based on RTAs have the dual advantage of building political and strategic relationships along with economic relationships.

For many developing countries managing the risks inherent in GVCs is an important policy challenge. However, once the absence of a viable counterfactual to GVCs is acknowledged, policy attention can be focused on the risks, which are many: demand compression in existing markets, ever-changing product and process standards, the emergence of new technologies, changes in labour markets and food security challenges. Robust domestic market conditions can function as an antidote to these risks, but small low-income economies with poor governance structures will feel especially vulnerable.

The issue of rule-making for GVCs is linked with the larger objective of a fair distribution of value between all participants. The fact that such rules (like standards) are often being made by lead firms in a GVC highlights the extent to which multilateral rule-making has lagged behind market realities. The “deep” regional trade agreements have tried to fill the breach but their multiplicity can only contribute to greater complexities in the noodle bowl. The most ambitious among them, the Trans Pacific Partnership (TPP), is now challenged by the newly launched Regional Comprehensive Economic Partnership (RCEP). Both a largely overlapping membership and overlapping value chains. These developments threaten the centrality of the WTO in the multilateral trading system and at the same time provide it with an opportunity to re-establish its relevance and pre-eminence. For this, the WTO requires a fresh mandate that acknowledges the organic linkages between manufacturing, services (including the movement of people), capital flows, technology and IPRs.

In view of the largely market-driven nature of GVCs, multilateral rule-making for them requires a bespoke approach. Rule-making through a public-private partnership platform is one option and there are some existing initiatives that can provide such a template. “Principles for Responsible Agricultural Investment that Respects Rights, Livelihoods and Resources”, a joint initiative of FAO, IFAD, UNCTAD and the World Bank, seeks to establish a code of good practices for agricultural investments while respecting local rights and concerns like food security in developing countries.²⁹ The principles provide a tool-kit of best practices, guidelines and governance frameworks for investors and host governments. The Extractive Industry Transparency Initiative (EITI) provides a global standard, based on public-private partnership, for ensuring transparency of payments from natural resources. It is followed in several countries.³⁰ Such initiatives can create a possible basis for intergovernmental agreements to assist low-income countries to obtain a fair share of value from GVCs. They cannot, however, be a substitute for basic development work like infrastructural development and capacity building in such countries.

Endnotes

- 1 Barrientos et al., (2011).
- 2 Gereffi (2012).
- 3 Gereffi – *ibid.*
- 4 Milberg and Winkler (2010).
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- 7 Gereffi and Frederick (2010).
- 8 Van Biesebroeck and Sturgeon (2010).
- 9 Sturgeon and Kawakami (2010).
- 10 Milberg and Winkler (2010).
- 11 Linden et al., (2007).
- 12 Baldwin (2012).
- 13 Kaplinsky and Farooki (2010).

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14 Global value chain-oriented industrial policy: the role of emerging economies

Gary Gereffi and Timothy Sturgeon

14.1. Introduction

In the past two decades, profound changes in the structure of the global economy have reshaped global production and trade and altered the organization of industries and national economies. The geographic fragmentation of industries, where value is added in multiple countries before products make their way to consumers, has been accompanied by vast improvements in the functional integration of these far-flung activities, creating what have come to be known as global value chains, or GVCs. As supply chains become global in scope, more intermediate goods are traded across borders, and more imported parts and components are embodied in exports (Feenstra, 1998). In 2009, world exports of intermediate goods exceeded the combined export values of final and capital goods for the first time, representing 51 per cent of non-fuel merchandise exports (WTO and IDE-JETRO, 2011). Governments and international organizations are taking notice of the effects of GVCs on global trade and development (OECD, 2011; WTO and IDE-JETRO, 2011; UNCTAD, 2013; World Economic Forum, 2013).

The rise of GVCs occurred in a period of falling trade barriers, the rise of the World Trade Organization (WTO), and the policy prescriptions associated with the “Washington Consensus” – governments had only to provide a strong set of “horizontal” policies (such as education, infrastructure, and macro-economic stability) and be open to trade to succeed. Of course, many observers noted that the fastest growing emerging economies did much more than this through a set of industrial policies that targeted key domestic industries for growth, either behind protectionist walls, known as import-substituting industrialization (ISI), and increased market access through export promotion, known as export-oriented industrialization (EOI). The goal of these

“domestic industrial policies” was to nurture a set of fully blown national industries in key sectors that could eventually compete head to head with the industrialized nations (Baldwin, 2011).

Today, despite a growing list of signatories to the World Trade Organization, industrial policy is on the upswing. WTO accession often comes with allowances for selective industrial policies (such as trade promotion, local content rules, taxes, tariffs and more indirect programs that drive local production) to remain in force for specified periods. Bilateral trade agreements can supersede what has been agreed to under WTO rules, and a handful of relatively large and advanced emerging economies (such as those in the G-20) have more influence in the institutions of global governance and are using it to create greater leeway to engage in activist industrial policies.

Still, the fragmentation of global industries in GVCs complicates industrial policy debates. In this chapter, we argue that there can be no return to the ISI and EOI policies of old. Domestic industries in both industrialized and developing countries no longer stand alone and compete mainly through arms-length trade; instead, they have become deeply intertwined through complex, overlapping business networks created through recurrent waves of foreign direct investment (FDI) and global sourcing. Companies, localities and entire countries have come to occupy specialized niches within GVCs. For these reasons, today's industrial policies have a different character and generate different outcomes from before. Intentionally or not, governments currently engage in GVC-oriented industrialization when targeting key sectors for growth. In this paper we develop the notion of GVC-oriented industrialization through a comparison of seven emerging economies and a case study of Brazil's consumer electronics industry.

The roots of GVCs extend back to experiments with global sourcing by a handful of pioneering retailers (such as JC Penny, Sears, Kmart) and manufacturing enterprises (IBM, General Motors, Volkswagen) that set up production in East Asia, Mexico and a handful of other locations around the world in the 1970s and 1980s with the explicit purpose of lowering production costs and exporting finished goods back to home markets (Fröbel et al., 1980; Dassbach, 1989; Gereffi, 1994, 2001).

After 1989, the opening of China, the Russian Federation, India and Brazil (the so-called “BRIC” countries) added huge product and labour markets that had been all but outside the capitalist trading system, nearly doubling the field of play for international

companies (Freeman, 2006). Faced with slow growth at home, large “lead” firms in GVCs rushed to set up operations in BRIC countries, especially China, in an effort to carve out brand recognition and market share in rapidly expanding consumer markets and to cut costs on goods produced for export back to home markets. This greatly accelerated the globalization process, since these giant economies offered seemingly inexhaustible pools of low-wage workers, increasingly capable manufacturing and trade infrastructures, abundant raw materials and huge underserved domestic markets with incipient middle classes.

Over time, retailers and branded manufacturers in wealthy countries became more experienced with international outsourcing. In response, developing countries acquired the infrastructure and capabilities needed to sustain larger scale operations, and suppliers upgraded their capabilities in response to larger orders for more complex goods (Hamilton and Gereffi, 2009). In the 1990s, the most successful US- and Europe-based manufacturers quickly became huge global players, with facilities in scores of locations around the world (e.g., Siemens, Valeo, Flextronics), and a handful of elite East Asian suppliers (Pao Chen, Quanta, Foxconn) and trading companies (for example Li & Fung) also took on more tasks for multinational affiliates and global buyers. These firms expanded production, not only in China but also in other Asian countries and more recently in Africa, East Europe and Latin America as well. As the resources in the global supply-base improved, more lead firms gained the confidence to embrace the twin – and often intertwined – strategies of outsourcing and offshoring.

In the 2000s, the industries and activities encompassed by GVCs grew exponentially, driving trade in finished goods and customized intermediates (such as components and sub-assemblies), spreading from manufacturing into energy, food and a growing set of services previously considered to be “untradeable,” ranging from call centres and accounting, to medical procedures and R&D (Dossani and Kenney, 2003; Engardio et al., 2003; Engardio and Einhorn, 2005; Wadhwa et al., 2008; Cattaneo et al., 2010; Staritz et al., 2011). The impact of these changes was felt most strongly in a handful of countries. China became the “factory of the world,” India the world’s “back office,” Brazil had a wealth of agricultural and primary commodities and the Russian Federation possessed enormous reserves of natural resources plus the military technologies linked to its role as a Cold War superpower. For goods that require shorter supply lines such as “fast fashion” apparel and automobiles, the countries of Eastern Europe joined more traditional “export processing” locations such as Mexico and North Africa.

The rapidity of these changes left the scholarly community struggling to catch up. Beginning in the early 2000s, the GVC concept gained popularity as a way of framing and characterizing the international expansion and geographical fragmentation of contemporary supply chains (Gereffi et al., 2001; Dicken et al., 2001; Henderson et al., 2002; Gereffi, 2005; Feenstra and Hamilton, 2006; Gereffi and Lee, 2012). Much of this research and theoretical work has focused on how “lead” firms in specific GVCs have driven this process in various ways. Decisions about outsourcing and offshoring are, after all, strategic decisions made by managers. Such decisions, however, are not made in a vacuum. The policies and programmes of countries and multilateral institutions set the context for corporate decision-making. We have seen an evolution in the form and effects of industrial policy along with the evolution of the business networks that comprise GVCs.

Today the organization of the global economy is entering a new phase, what some have referred to as a “major inflection point” (Fung, 2011), which could have dramatic implications for both emerging and industrialized countries, firms and workers. As world trade rebounds from the 2008–09 economic crisis, emerging economies have become a major engine of growth. Slow growth in the global North since the mid-1980s was dampened further by the latest crisis, whereas demand is quickly growing in the global South, particularly in large emerging economies like China, India and Brazil (Staritz et al., 2011). Over the period 2005–10, the merchandise imports of the European Union and the United States increased by 27 per cent and 14 per cent, respectively, while emerging economies expanded their merchandise imports much faster: Brazil (147 per cent), India (129 per cent), China (111 per cent) and South Africa (51 per cent). These differences represented more than an acceleration of previous global sourcing arrangements; they represented a shift in end markets to the developing world: in 2010, a full 52 per cent of Asia’s manufactured exports were destined for developing countries (WTO, 2011).

Clearly, developing countries are now in a position to exert greater influence over the shape of the global order, economically and politically, as the impact of the “Washington consensus” as a paradigm for developing countries wanes (Gore, 2000). However, no overarching alternative development strategy has taken its place. Thus, our analysis of GVCs in this new period must take account not only of changes in the organization of production and trade on a global scale, but also the role of emerging economies as new markets and production hubs in the global economy.

The remainder of this chapter is divided into four parts. First, we examined the export performance of seven of the most significant emerging economies: China, India,

Brazil, Mexico, the Russian Federation, the Republic of Korea and South Africa, noting the changing distribution of their exports across four broad technology categories between 2000 and 2011. Second, we then examine the kinds of industrial policies utilized by these emerging economies and propose a new typology that includes the category of GVC-oriented industrial policies. Third, we illustrate how industrial policy intersects with GVCs in the context of the consumer electronics industry in Brazil. We conclude with a reprise of GVC-oriented industrial policies and provide some reflections about the implications of these trends for the future of the global economy.

14.2. Emerging economies in comparative perspective

A dynamic set of large emerging economies, initially referred to as BRICs (Brazil, the Russian Federation, India and China), are becoming significant drivers of aggregate supply and demand in the global economy.¹ In this section, we broaden the focus to a set of seven emerging economies that belong to what O'Neill (2011) sees as contemporary "growth economies": China, India, Brazil, Mexico, the Russian Federation, the Republic of Korea and South Africa. These countries are quite diverse in terms of their economic and social characteristics. However, they are all centrally involved in distinct types of GVCs in agriculture, extractive industries (mining, oil and gas), manufacturing, and services. Together, these seven emerging economies account for 45 per cent of the world's population, 23 per cent of gross domestic product (GDP), and 22 per cent of global exports, and their GDP growth rates are nearly double the world average (4.8 per cent versus 2.7 per cent). See Table 14.1.

The specific roles of these seven countries in the global economy vary according to their openness to trade and foreign investment; endowments of natural, human and technological resources; their geopolitical relationships to the world's most powerful countries; and the characteristics of their immediate neighbours. Many have significantly improved their relative position in the global economy, surging ahead of the advanced industrial countries in terms of export performance for example. Between 1995 and 2007, the global export shares of the United States and Japan fell by 3.8 and 3.7 percentage points, respectively, while China more than doubled its share from four per cent in 1995 to 10.1 per cent in 2007, making it the world export leader (ahead of Germany, the United States and Japan). The Republic of Korea, Mexico, Turkey, South Africa, and the former transition countries in central Europe also increased their export shares during this period (Beltramello et al., 2012).

TABLE 14.1: Seven selected emerging economies in comparative perspective, 2011

Country	2011				GDP			Per cent of GDP		
	Population (Millions)	Exports (US\$ Billions)	GDP (US\$ Billions)	GDP/capita (US\$)	GDP/capita (PPP)	growth YoY (Per cent)	Agriculture	Industry	Services	
China	1,344	\$1,899	\$7,318	\$5,445	\$8,450	9.1	10	47	43	
Brazil	197	\$256	\$2,476	\$12,594	\$11,500	2.7	5	28	67	
Russian Federation	142	\$516	\$1,858	\$13,089	\$19,940	4.3	4	37	59	
India	1,241	\$303	\$1,848	\$1,489	\$3,620	6.9	17	26	56	
Republic of Korea	50	\$557	\$1,116	\$22,424	\$30,340	3.6	3	39	58	
Mexico	115	\$350	\$1,115	\$10,064	\$15,060	3.9	4	34	62	
South Africa	51	\$97	\$408	\$8,070	\$10,710	3.1	2	31	67	
Total or Avg.	3,140	\$3,978	\$16,139	\$10,454	\$14,231	4.8	6.4	34.6	58.9	
World Total	6,974	\$17,979	\$69,980	\$9,511	-	2.7	15.7*	31.8*	52.7*	
Per cent of World Total	45.0%	22.1%	23.1%	109.9%	-	177.8	40.9	108.7	111.7	

Sources: World Bank: <http://data.worldbank.org>; UN Comtrade, International Trade Center.

*These world averages are taken from nations with existing data. Not all nations were consistent across categories.

Although collectively these seven nations have considerable economic influence China is the global pacesetter of the group. While China and India are the most populous countries in the world at 1.3 and 1.2 billion inhabitants, respectively, China is the undisputed export leader with US\$ 1.9 trillion in exports in 2011. China's export total is equal to that of the Republic of Korea, the Russian Federation, India, Brazil and Mexico combined, while China's GDP has grown at over nine per cent per year for over 30 years. It is now the second-largest economy in the world (trailing only the United States) and has overtaken Germany as the world's largest exporter (Beltramello et al., 2012). Notwithstanding China's rapid economic growth, its GDP per capita is the second lowest among the emerging economies in 2011 (US\$ 5,445), well ahead of India (US\$ 1,489), but less than half that of Brazil and the Russian Federation, and just one-quarter that of the Republic of Korea. On average, the GDP per capita of these seven emerging economies is about ten per cent above the world average in 2011 (see Table 14.1).

An indicator of the roles emerging economies play in GVCs can be found in their export profiles, broadly classified by the technological content of their exports. Using a classification scheme introduced by Sanjaya Lall (2000) that groups traded goods according to primary products plus four types of manufactured exports (resource-based, low-tech, medium-tech and high-tech), Table 14.2 highlights some of the differences between these countries in terms of their export profiles. Three of the emerging economies are heavily oriented toward primary product or resource-based exports (the first two columns in Table 14.2): the Russian Federation (72 per cent), Brazil (69 per cent), and South Africa (59 per cent). Half of India's exports are resource oriented, with another 40 per cent being low tech (primarily apparel products) and medium technology manufactured goods.² China, the Republic of Korea and Mexico, by contrast, are heavily involved in manufacturing GVCs. Over 90 per cent of China's exports are manufactured goods, while a preponderance of the exports by the Republic of Korea (72 per cent) and Mexico (60 per cent) are medium technology (automotive, machinery) and high technology (mainly electronics) exports.

If we look at trends in these export patterns between 2000 and 2011, we see that China and India have increased their exports over six-fold, Brazil and the Russian Federation each increased their exports around 360 per cent, and South Africa and the Republic of Korea more than doubled their exports (Table 14.2). The fastest growing exports in these countries were primary products and resource-based manufactures. The boom in primary product exports since 2000 has largely been driven by China's

TABLE 14.2: Export profile percentages of total exports: 2011

Country	Industrial sector					Export		Change in percentage value 2000–11					Export value 2000–2011 Per cent increase
	Primary products	Resource based	Low- tech	Med- tech	High- tech	Value (US\$ Bil)	High- tech	Primary products	Resource based	Low- tech	Med- tech	High- tech	
China	3	9	30	24	33	1898		(4)	(0)	(11)	5	10	662%
Brazil	32	37	5	19	4	256		11	10	(7)	(6)	(8)	365%
Russian Federation	45	27	2	8	1	478		(3)	8	(3)	(4)	(3)	364%
India	11	39	21	17	8	301		(3)	10	(18)	6	3	617%
Republic of Korea	3	16	9	45	27	555		0	5	(7)	11	(9)	223%
Mexico	20	8	9	38	22	350		7	3	(7)	0	(6)	111%
South Africa	29	30	5	26	3	93		13	(0)	(5)	0	(2)	254%

the Russian Federation had more than 17 per cent of uncategorized exports.

Source: United Nations Comtrade, SITC Rev. 2.

imports of the raw materials needed to fuel its industrial growth. At the same time, low-technology exports declined in all of these emerging economies, reflecting slack consumer demand in advanced economies, especially as a result of the 2008–09 economic recession.

Though such gross export figures do not account for the technological content of imported inputs, which new data sets will allow us to determine in future research,³ it is still notable that these emerging economies made their most significant gains in exports of high and medium-technology products, previously the stronghold of advanced industrial countries. While the export of final products provides only a partial picture of the technological development of each economy, it does signal that these countries have come to play important roles in the GVCs of relatively advanced products in technology-intensive industries, such as electronics and motor vehicles. This phenomenon was mainly driven by China, whose share of exports of goods in high-tech industries (mainly electronics) soared by 13.5 percentage points in the period 1995–2007, moving it ahead of the United States as the world's largest exporter of high-tech products (Beltramello et al., 2012).

In summary, our focus on these seven emerging economies serves two purposes. First, we demonstrate that these large, dynamic countries are deeply entrenched in GVCs but in very different ways. Second, given recent changes in the global economy, we believe that the role of emerging economies in GVCs is undergoing a number of changes in the post-Washington consensus era, including an increasingly central role for China, a greater emphasis on production and upgrading for the domestic market, shifting export markets with a greater role for South-South trade, and a new form of industrial policy in emerging economies (Gereffi, forthcoming). It is to this latter topic that we now turn.

14.3. GVCs and industrial policy: an evolving debate

Twentieth-century debates over the merits of industrial policy as a strategy for economic development occurred before there was broad recognition of the importance of GVCs (Amsden, 1989; Wade, 1990; World Bank, 1993; Evans, 1995; Chang, 2002). The GVC lens provides some crucial insights into the processes of contemporary economic development. A main difference is the potential for vertical specialization, not only at the level of firms but also at the level of nations. China might be the “world's workshop,” but much of the work is in producing products designed and developed elsewhere. The central goals of industrial policy in the GVC context

shift from creating fully blown, vertically integrated national industries to moving into higher-value niches in GVCs.

Industrial policies that take the new realities of GVCs into account include traditional measures to regulate links to the global economy, especially regulation of trade, FDI and exchange rates used in ISI and EOI policies that sought to elevate the position of “national champions” (Baldwin, 2011). Today, GVC-oriented industrial policy focuses to a greater extent than in the past on the intersection of global and local actors, and it takes the interests, power and reach of lead firms and global suppliers into account, accepts international (and increasingly regional) business networks as the appropriate field of play and responds to pressures from international non-governmental organizations (NGOs). Upgrading national firms in this context is not an easy task. Because GVC lead firms induce suppliers in different countries to compete with each other for orders, and they often choose to work with the same global suppliers in multiple locations to reduce transaction costs, states tend to have less leverage to demand local content requirements or less scope to develop links to domestic suppliers.

In the face of such challenges, some large emerging economies are shifting their development strategies inward and relying more extensively on regional production networks buttressed by regional industrial policy. China’s upgrading strategy now operates on a global scale because Chinese firms have become such large foreign investors and buyers of raw materials (Kaplinsky et al., 2010). China’s rise as a major global buyer means that South-South trade will continue to expand as a share of world trade. While China has instituted policies to ensure domestic processing of raw materials from the rest of the world, China’s trading partners are resisting these.⁴

One example is South Africa, whose policy emphasizes regional integration as a basis for industrial upgrading, focused on mining, agriculture and pharmaceuticals (Davies, 2012). South Africa has announced a strategy of additional processing of regionally sourced minerals shipped to China in order to drive skill development, higher wages and large profits within Africa. While it remains to be seen how other countries in Sub-Saharan Africa respond to these ideas since higher value processes are likely to be concentrated in South Africa, this regional industrial policy is based on the view that African companies will have access to more minerals and raw materials, greater productive and processing capacity and larger markets, resulting in region-wide upgrading.

This suggests that regional integration strategies, including preferential trade agreements (PTAs), economic cooperation arrangements and regional production networks will increasingly be based on supply-side strategies rather than the traditional demand-side considerations that usually justify regional integration. The demand-side logic of regional integration highlights expanding market size, market access and the possibility of capturing FDI and better scale economies by serving this larger market. The supply-side approach uses regional integration to create scale and complementarities that can drive more production and processing and thus higher-value exports from the region.

Large emerging economies clearly have more options in terms of upgrading within GVCs than small economies. They can focus on manufactured exports, as China and Mexico have done since the mid-1990s, but they can also reorient their productive capacity to serve domestic demand if export markets become less attractive. While both small and large countries can pursue upgrading at the regional level by diversifying or adding new capabilities that aren't available at the national level, large countries clearly have more leverage in such arrangements. Large countries with high potential for market growth (such as the BRICs) can also institute policies to drive FDI in technology- and capital-intensive sectors such as electronics and motor vehicles.

Small countries have fewer options. Their market size is not large enough to attract FDI for the local market, and domestic firms tend to be small-scale and less advanced. However, the regional organization of some GVCs has created opportunities for smaller countries to leverage low costs and proximity to large markets to build export capacities in specialized GVC niches (like intermediate goods) in the context of regional production systems. Costa Rica, for example, has clear supply-side constraints related to productive capacity and skills and conceivably could partner with Mexico to enhance its training programs and skills development. Nicaragua, whose apparel firms have been buying textiles from East Asia, is consciously pursuing supply arrangements with textile firms in Honduras and Guatemala. In sum, specialization and regional GVC linkages matter for political and economic integration in a way that was not the case previously.

In order to view these industrial policies in a more systematic way, we have created a typology of the various kinds of industrial policies that characterize the contemporary emerging economies (see Table 14.3). We distinguish three types of industrial policies: “horizontal” policies that affect the entire national economy; “selective”, or “vertical”, industrial policies targeted at particular industries or sectors; and GVC-oriented

TABLE 14.3: Overview of industrial policies in emerging economies

Horizontal policies (economy-wide)	Brazil	China	India	Mexico	Russian Federation	South Africa	Korea, Rep. of
Improved infrastructure, especially trade and transportation infrastructure	●	●	○	●	●	○	●
Increased education (particularly STEM education)	●	●	●	○	●	○	●
Workforce development	●	●	●	●	○	○	●
Investment in R&D	●	●	●	○	●	○	●
Sustainable energy development	●	●	●	●	●	●	●
Tax incentives	●	●	●	●	●	●	●
Foreign direct investment	○	●	●	●	●	○	●
Free trade agreements	●	●	●	●	○	○	●
Vertical domestic industrial policies (industry specific)							
Targeting specific industries, including key upstream links or inputs	●	●	●	●	●	○	●
Priority industries	Airline, defence	Advanced mfg./ consumer electronics	Electronics & IT	Export processing manufacturing	Oil/coal/autos	Autos/apparel/horticulture	Chaebols (electronics, automotive)

Horizontal policies (economy-wide)	Brazil	China	India	Mexico	Russian Federation	South Africa	Korea, Rep. of
GVC-oriented industrial policies							
Specialization in GVC niches in global and regional production networks, to add value to primary or industrial commodities	●	●	●	●	●	●	●
Local content requirements to attract global suppliers, and policies to facilitate intermediate and primary goods imports	●	●	●	●	●	●	○
Use of GVC links to upgrade domestic production and brands (for large economies)	●	●	●	●	●	●	●
Key:							
○							●
Unimportant	Moderate importance						Particularly significant

Source: Author.

industrial policies that leverage international supply chain linkages or dynamics to improve a country's role in global or regional value chains.

"Horizontal" policies focus on the basic building blocks of competitive national economies such as education, health, infrastructure and R&D expenditures. Although these areas all provide attractive opportunities for private investors, the public sector typically plays a role in providing widespread access to these factors as public goods. While "horizontal" policies are crosscutting and in principle have economy-wide effects, such policies may also target particular national industries or GVCs (such as tax credits for shale gas or oil investors). In these cases, the policy in question could be analysed in either of the other two categories in Table 14.3.

Domestic industrial policies tend to be "selective" or "vertical" because they are associated with prioritizing particular industries at the national level. This has been justified for various reasons including the following: (a) these industries are considered strategic in terms of natural resources (like oil, natural gas and minerals in the Middle East and Latin America); (b) they present exceptional opportunities for forward and backward linkages with domestic suppliers (autos in Mexico and Brazil; electronics in Japan, the Republic of Korea and China); (c) they have an impact on national security in terms of defence or critical consumption needs (military procurement, essential medicines, basic foodstuffs during famines or droughts); and (d) the policies support "infant industries" that need temporary protection from larger and more established international competitors. In practice, these industrial policies were associated with the import-substitution (ISI) development strategies that became popular in Latin America, South Asia and other developing regions from the late 1950s through the early 1980s, and effectively they were disrupted by the Latin American debt crisis of the 1980s and displaced by EOI development strategies associated with the rise of East Asia and the "Washington Consensus" in the 1990s (Gereffi and Wyman, 1990; World Bank, 1993).

GVC-oriented industrial policies go beyond the domestic economy focus of ISI-style policy regimes which try to recreate entire supply chains within a national territory. Given the international production networks associated with GVCs, this type of industrial policy explicitly utilizes extra-territorial linkages that affect a country's positioning in global or regional value chains. In the global apparel industry, for instance, a good illustration of GVC-oriented industry policies were the "triangle manufacturing" networks associated with East Asian economies, such as Hong Kong, China; Chinese Taipei and the Republic of Korea (Gereffi, 1999). In order

to deal with the quota constraints put in place by the Multi-Fiber Arrangement that regulated apparel trade from the 1970s through 2005, East Asian textile and apparel manufacturers complemented the strengths of their domestic economies in product development, design and textiles by seeking out low-cost apparel suppliers in various regions of the world, and these East Asian middleman firms would also sell to global buyers (large apparel retailers and brands) using flexible triangle manufacturing schemes to improve the competitiveness of East Asian economies in the apparel GVC by coordinating the activities of multiple actors across the chain.

Current examples include efforts to create and sustain regional supply chains that provide needed inputs for national export success, such as the East Asian supply base that has been created for China's electronics inputs needed for its exports of smart phones (Xing and Detert, 2010; Gereffi and Lee, 2012). Case studies in Central America and Sub-Saharan Africa showcase efforts to create regional integration arrangements that could strengthen the export position of countries in each region by sourcing inputs from regional neighbors – e.g., textiles and apparel in Central America or Sub-Saharan Africa (Bair and Gereffi, 2013; Morris et al., 2011) and minerals processing in Sub-Saharan Africa (Davies, 2012).

Table 14.3 highlights the varied industrial policy instruments utilized by the seven emerging economies that we focus on. Brazil, China, India and the Republic of Korea deploy the most extensive array of horizontal or economy-wide policies. In terms of selective domestic industrial policies, most of the emerging economies have particular industries that they deem particularly important, and these are supported by policies requiring local content, joint ventures, local R&D or other benefits that tend to favour domestic over foreign firms. Finally, there is a third and relatively new category of industrial policy that is oriented to improving a country's position in GVCs. These policies recognize that a country's possibilities for upgrading depend at least in part on links across different segments of the value chain, within a regional or global context.

While free trade agreements are enabling factors that permit greater openness to GVCs, these are often supplemented by policies that try to induce regional production networks in specific industries to facilitate functional upgrading or the opportunity of emerging economies to more fully exploit regional economies of scale and scope. In East Asia, China benefits from close economic ties with many of its East Asian neighbours that facilitate imports of materials and components that go into China's manufactured export products. In South Africa and Brazil, there are policies to limit the

restrictions that trade partners (like China) have placed on the processing of primary product exports. Thus, GVC-oriented industrial policies seek to improve the ability of emerging economies to enhance their upgrading opportunities within these chains by facilitating both intermediate and primary goods trade.

14.4. GVC-oriented industrial policies in action: the case of Brazil

Brazil's development strategy has both similarities and distinctive elements when compared to South Africa and China. Although Brazil belongs to Mercosur – a regional trade agreement that includes Argentina, Uruguay, Paraguay and Venezuela – this does not reflect a pan-Latin America vision analogous to that of South Africa's economic integration plans for Sub-Saharan Africa (Davies, 2012) nor does it embody the highly efficient regional division of labour that China participates in with its East Asian neighbours. Brazil dominates Mercosur by its size and level of economic development, and thus it occupies an asymmetric position in terms of regional integration. Mutual gains from the long-heralded complementarities between Brazil and Argentina in the automotive sector have been weakening. Like South Africa, Brazil is concentrated in primary product exports with relatively low levels of processing and is seeking to reverse the so-called “primarization” of its export profile (Jenkins, 2012).

This is not entirely a new situation. ASEAN had been driven in part by Toyota and Ford's search for a secure regional production network through complementarity schemes (Sturgeon and Florida, 2004). Access to low-cost auto parts was also an important consideration for the automotive firms that promoted the North American Free Trade Agreement (NAFTA). But today, these efforts are proliferating. China is seeking to strengthen the regional production system in East Asia, South Africa has announced a regional integration and industrial policy to promote upgrading in raw materials production, and Brazil and its Mercosur neighbours are broadening their customs union to build regional supply-side capabilities.

As we have already mentioned, a major challenge for some large emerging economies that have become primary product exporters based on high demand from China is how to increase the technological content of their exports in order to move into higher value activities. For example, China is Brazil's largest trading partner, accounting for about 15 per cent of Brazil's exports and imports in 2010. From a GVC perspective, what is particularly notable is that the pattern of Brazil's exports to China is skewed

toward products (both primary commodities and manufactured goods) with very low levels of processing.

The soybean value chain is a good example. About 95 per cent of Brazil's soybean exports to China in 2009 were unprocessed beans. In contrast, there were virtually no exports of soybean meal, flour or oil to China. In order to pursue its strategy of promoting the Chinese soybean processing industry, China imposed a tariff of nine per cent on soybean oil imports, while the tariff on unprocessed soybean imports was only three per cent. Imports of products based on processed soybeans were also levied at a higher value-added tax rate in China than were unprocessed beans. Similar protectionist policies, including both tariff and non-tariff barriers, have been imposed by the Chinese government on other primary and processed intermediate products from Brazil, including leather, iron and steel, and pulp and paper (Jenkins, 2012).

On the import side, Brazil has also been influenced by China's structure of international trade. In 1996, low-technology products accounted for 40 per cent of Brazil's imports from China, while high-technology products were 25 per cent. By 2009, the pattern was nearly reversed: high-tech products were 41.4 per cent of the total, and low-tech products were 20.8 per cent. If we look at this trend in terms of the end use of imports, consumer goods imports from China to Brazil fell from 44 per cent to 16 per cent between 1996 and 2009, while the imports of capital goods doubled from 12 per cent to 25 per cent and parts for capital goods rose from 12 per cent to 25 per cent (Jenkins, 2012). Thus, Brazil has fallen to the lowest rungs of the value-added ladder in its trade with China in recent decades.

While the trade relationship with China is the most severe challenge for Brazil, the problem is more pervasive. For example, Embraer, a successful Brazilian producer of regional passenger aircraft, depends on imports for 100 per cent of its aircraft-grade aluminium, despite Brazil's abundance of the aluminium ore (bauxite) and rare minerals required for aircraft-grade alloys. South Africa has had some success in this regard. It is the largest exporter of catalytic converters for use in vehicle exhaust systems, products that rely on platinum, a precious metal that is abundant in South Africa.

Leveraging consumer electronics GVCs to build capabilities in Brazil

An instructive case of how GVCs intersect with national industrial policies can be found in Brazil's recent efforts to leverage its large and growing internal market

to build domestic capabilities in the consumer electronics sector. A growing middle class in Brazil has begun to demand consumer electronics on an unprecedented scale. According to the World Bank (2012), Brazil's poverty rate declined from 41.9 per cent in 1990 to 21.4 per cent in 2009. As a result, mobile phone handset penetration in Brazil has nearly doubled in recent years, from 32 million units in 2004 to 58 million in 2011 (ABINEE, 2012). In addition, Brazil is currently the world's third largest personal computer (PC) market, with 17 million units sold in 2012 (IDC 2012). The market is dominated by global lead firms such as Apple, Dell, Hewlett Packard (United States), and Lenovo (China), but a local producer, Positivo, has about 25 per cent of the corporate PC market, and it recently unveiled several smart phone models based on Google's Android operating system. Demand for tablet computers is also growing quickly. Sales of smart phones and other Internet-connected mobile devices are expected to increase dramatically with Brazil's hosting of the World Cup soccer championship in 2014 and the Olympic Summer Games in 2016, and this will drive huge investments in equipment to upgrade Brazil's already strained infrastructure for voice connectivity and data communications.

Because of these changes, Brazil's overall trade performance in the electronics sector recently turned negative. Between 2007 and 2010, consumer electronics exports from Brazil declined by 25 per cent, while imports skyrocketed by over 140 per cent (see Table 14.4). A significant portion of this decline can be explained by the shift to smart

TABLE 14.4: Brazilian electronics exports, imports and production, 2007–2010 growth rates

Electronics sub-sector	Per cent export growth	Per cent import growth	Per cent production growth
Medical electronics	25.4	62.9	107.6
Computers and storage devices	-61.9	31.9	58.9
Consumer electronics	-24.8	142.7	39.6
Industrial equipment	7.9	36.8	35.1
Computer peripherals and office equipment	-12.5	63.6	35.0
Automotive electronics	12.6	51.8	33.1
Communications equipment	-46.8	-26.0	-28.8
Electronic components	-26.5	96.6	-48.5
Total electronics	-32.3	36.0	13.5

Source: Production Data: Conversions from CONCLA Correspondence Tables; Data from IBGE; Trade Data: UN Comtrade.

phones, tablet computers and notebook computers – products that are displacing the feature phones and desktop computers produced in Brazil – both for the local market and for export to developing country markets with compatible standards. For example, in 2004, before the smart phone market was fully established, Brazil exported 10 million units per year and imported just 1.3 million units. By 2007, the year Apple computer introduced the first iPhone, Brazil's feature phone exports were valued at more two billion US dollars per year. As the market for smart phones took off, export and local demand for feature phones plummeted, and by 2011 Brazil was importing 15.7 million handsets and exporting only 7.4 million (ABINEE, 2012). In response, feature phone producers in Brazil, such as NEC (Japan) and Nokia (Finland), withdrew from local production.

These rapid market shifts brought a new set of players to the fore, namely Apple and the many makers of Android-based smart phone handsets and the contract manufacturers that produce the bulk of these products, such as Flextronics (United States and Singapore) and Foxconn (Chinese Taipei). Market growth and access to its Mercosur trading partners are providing Brazil with the leverage it needs to demand local production and content from consumer electronics and communications GVC lead firms, who in turn have put pressure on their key global suppliers to make investments in Brazil. To exploit this opportunity, Brazil is bringing to bear a range of old and new policies aimed at spurring local production in the electronics sector. The key laws and programs to stimulate local production are listed and described in Table 14.5.

Like the ISI policies of old, Brazil's current industrial policies consist mainly of tax incentives meant to spur local R&D, assembly and component manufacturing. But because GVCs bring new actors and industry structures to the fore, the challenges, opportunities and outcomes related to these policies are different. For example, a centrepiece of Brazil's strategy to increase local production of consumer electronics has been to attract global contract manufacturers, known in the industry as electronic manufacturing services (EMS) providers. As electronics lead firms such as Apple and Hewlett Packard continue to outsource manufacturing, contract manufacturers have become increasingly important players in the component purchasing, assembly, test and after-sale service functions of electronics GVCs. The threshold for new investments, however, is high (large, globally operating contract manufacturers rarely open up a new automated circuit board assembly line for orders less than several hundred thousand units), and the promise of business from a single customer is rarely enough.

TABLE 14.5: Brazil's electronics-related industrial policies

Policy mechanism	Details
Informatics Law:	The Informatics Law of 1991 initially recognized the importance of the electronics sector and sought to incentivize local production and R&D through the use of Basic Production Processes (PPBs) and R&D investment quotas.
Local content incentives:	Firms are encouraged to manufacture in Brazil through product-specific PPBs – “the minimum group of operations, within the industrial plan, which characterizes real industrialization of a certain product” (Egypto 2012). PPBs reduce industrial product taxes (IPI) on final products from 15 per cent to nearly zero, and suspend IPI altogether when firms purchase raw materials, intermediate products and packaging goods used in the production process. In addition to federal incentives, PPBs allow for a reduction in ICMS (state VAT) in many states (Apex Brasil 2012). They can be claimed for production carried out in any area of the country (aside from the Manaus Free Trade Zone, which is governed by a different set of laws). PPBs are product, not company specific; only those products meeting the PPB's criteria receive benefits. They are defined and monitored by the Ministry of Science, Technology and Innovation (MCTI) and Ministry of Development, Industry and Foreign Trade (MDIC). PPBs set “nationalization indices” that define how much of the incentivized product must be local in content in order to retain the incentives offered. For example, the PPB for computer tablets in 2012 set the nationalization index at 30 per cent; the stated objective is to raise the nationalization index to 80 per cent by 2014. The PPB goes below the aggregate product to develop its nationalization index. What does it mean for a tablet to be 80 per cent “Brazilian” by 2014? According to the tablet PPB, this means that by 2014, 95 per cent of the motherboard, 80 per cent of the wireless communications interface, 30 per cent of the mobile network access card, 80 per cent of the AC/DC converter, 50 per cent of the memory card and 50 per cent of the display must be produced in Brazil (Positivo 2012). Therefore, the future of nationalization indices for electronics products will depend largely on the development of a local component industry, something that the Brazilian government has sought to address for the last decade.
R&D spending requirements:	In exchange for these benefits, firms must invest four per cent of gross revenue from incentivized products in local R&D. ¹ What constitutes R&D is largely flexible, allowing firms to pursue strategic objectives largely unhindered by government requirements. The key stipulation is that R&D must involve the discovery of a new technology or the development of new workforce capabilities, and not simply extend an existing, mature technology (Egypto 2012).
Incentives for the semiconductor industry:	The Brazilian Microelectronics Program, launched by the Ministry of Science and Technology in 1999, sought to incentivize segments of IC manufacturing by offsetting exorbitant capital requirements involved in building a foundry with the latest technological capabilities. This focus on microelectronics continued through the “Política industrial, Tecnológica e de Comércio Exterior” (PITCE) enacted by President Lula in March, 2004. PITCE focused on developing outward-oriented software and integrated circuit industries, among various others deemed to be of strategic importance to the country. Support for the microelectronics industry has expanded since then with the enactment of the Brazilian Program for the Development of the Semiconductor and Display Industry (PADIS) in 2007, a program was designed to develop local semiconductor and display industries by targeting companies investing in R&D and manufacturing capabilities in Brazil (Sales 2012). It has continued to be a focus of the country's broad industrial policies like the “Productive Development Policy” (PDP) between 2008 and 2010 and “Plano Brasil Maior,” which was enacted by President Rousseff in 2011 and will run through 2014 (Apex Brasil 2012).

Policy mechanism	Details
Plano Tecnologia da Informação TI Maior:	Software is the fastest growing IT market segment in Brazil at 16 per cent compound annual growth rate (CAGR) between 2011–2015 (Business Monitor International 2012); the market itself is worth US\$ 5.5 billion according to the MCTI. With the value of software increasing relative to the value of hardware, the government is creating policies to foster growth in this node of the electronics GVC. Brazil has long had a viable cluster of software SMEs. Plano TI Maior is the most recent attempt to scale these firms up, the majority of which remain small and unable to compete outside Brazil. Plano TI Maior seeks to leverage Brazil's existing base of firms and capabilities as well as the world's 7 th largest IT market to foster local industry growth. The most important component of Plano TI Maior is CTENIC, an equivalent of the PPB for software. This certification is currently under development and will define what constitutes "Brazilian software". When developed, CTENIC will create opportunities for preferential procurement if firms develop software locally. Explicit efforts to bolster software development in Brazil are important, as software developers cost considerably more in Brazil than they do in China and India.

Source: Authors.

Seven of the 12 largest contract manufacturers are based in Chinese Taipei (see Table 14.6). One of Chinese Taipei's most successful contract manufacturers, Foxconn Electronics (Hon Hai Precision Industry), has eclipsed its competitors,

TABLE 14.6: Top global EMS and ODM contract manufacturers in 2011

Rank	Company	Primary business model	Ownership	2011 Revenues (US\$M)	Manufacturing facilities in Brazil?
1	Foxconn Electronics	EMS	Chinese Taipei	\$93,100	Yes (4*)
2	Quanta Computer	ODM	Chinese Taipei	\$35,721	No
3	Compal Electronics	ODM	Chinese Taipei	\$28,171	Yes (1)
4	Flextronics	EMS	US & Singapore	\$27,450	Yes (3)
5	Winstron	ODM	Chinese Taipei	\$19,538	No
6	Jabil Circuit	EMS	US	\$16,760	Yes (2)
7	Inventec Corp	ODM	Chinese Taipei	\$12,696	No
8	Pegatron Corp.	ODM	Chinese Taipei	\$12,418	No
9	Celestica	EMS	Canada	\$7,210	No
10	Sanmina SCI	EMS	US	\$6,040	Yes (1)
11	Cal-Comp Electronics	ODM	Thailand	\$4,469	No
12	Lite-On IT Corp	ODM	Chinese Taipei	\$4,125	No

Source: The Circuits Assembly, Top 50 EMS Companies 2011; Company Annual Reports, *Bloomberg Businessweek*.

*Foxconn agreed to open 5th plant in Sao Paulo in 2014, will reach full capacity and employ 10,000 in 2016.

bringing in almost three times the revenue of the second-place contractor, Quanta Computer. However, Foxconn, much like other EMS contract manufacturers, suffers from low profit margins (just 2.4 per cent in 2011) and must compete on a global level to maintain market share (Mishkin and Palmer, 2012). Foxconn's close relationship with Apple has been its main driver of revenue growth. Contract manufacturers fill an increasingly complex role in the electronics GVC; they must not only work closely with lead firms to develop products and meet tight production schedules but also with a worldwide network of component manufacturers and distributors to ensure that they can meet demand and keep their lines operating at, or near, full capacity.

Thanks to Brazil's GVC-oriented industrial policies and direct pressure on the company from policymakers, Foxconn has begun to assemble iPhones, iPads and most recently iPad minis for Apple in Brazil. While Foxconn currently imports 90-95 per cent of its components, the company, which is more vertically integrated than most EMS firms, is likely to begin to manufacture components, including displays, in Brazil. Recent negotiations for a fifth Foxconn factory in Brazil have included language to suggest that once production is at 100 per cent (projected to be 2016), Foxconn will be manufacturing components including cables, cameras, touch-sensor glass, LED products and printed-circuit boards (Wang, 2012).

Hewlett Packard (HP) uses three global contract manufacturers to produce in Brazil (Foxconn, Flextronics and Jabil Circuit). Products include computers, desktop PCs, notebook PCs, workstations, computer servers, single function printers and multi-function printers. Local production accounts for 95 per cent of local sales. HP imports low-volume products such as large format printers, high-end servers and some high-end portable computers and makes printer ink cartridges in its own plant using a proprietary manufacturing process. Most components are imported except RFID chips for printer cartridges, which are developed by CEITEC, a local government-supported semiconductor foundry.

But hardware production is only part of the picture. In meeting the requirements for local R&D spending (four per cent of sales), HP Brazil employs 400 engineers and researchers in its laboratory in the south of Brazil and has contracts with another 1,000 collaborators from universities and research centres in the country. It also has four software centres working on local customer-specific applications, while contract manufacturers are being used to help meet the R&D spending requirement. Two of HP's research centres have been set up in collaboration with the Flextronics Institute of Technology (FIT): the RFID Center of Excellence, which has worked on over 100

RFID-related projects with HP; and the newer Sinctronics IT Innovation Centre, which focuses on environmental compliance and product recycling (Flextronics International, 2012). Like manufacturing capacity, the R&D of contract manufacturers can serve multiple lead firms. In addition to the work it does for HP, FIT runs research institutes to develop software solutions for IBM servers and Lenovo computers. It even conducts R&D on behalf of competitors like Foxconn and Compal, which do not have the R&D facilities in Brazil needed to spend their R&D quota internally. In other words, Flextronics has been able to develop economies of scale in R&D, much like it does through its manufacturing and assembly services.

The presence of global contract manufacturers in Brazil creates a number of immediate advantages. The most obvious is jobs. For example, Foxconn currently employs 6,000 in Brazil and could add 10,000 more jobs by 2016 (Luk, 2012). Because contract manufacturers serve multiple customers, their manufacturing capabilities can satisfy local content requirements for multiple brands. Production capacity is generic and flexible enough to effectively pool capacity across all high-volume segments of the electronics industry. Capacity can be switched toward product categories and firms that are successful in the local market and in exporting. The focus of Brazil's GVC-oriented industrial policy on attracting investments by contract manufacturers, as well as GVC lead firms, signals a sophisticated understanding of the dynamics of the electronics GVCs by policy-makers. Contract manufacturers provide a leading-edge, flexible and scalable platform for local production and R&D. Lead firms like Apple and HP tend to use the same contractors on a global basis, and their presence in Brazil lowers the bar for localization.

14.5. Conclusions: what do GVC-oriented industrial policies look like?

Emerging economies are playing significant and diversified roles in GVCs. During the 2000s, they have become major exporters of intermediate and final manufactured goods (China, the Republic of Korea and Mexico) as well as primary products (Brazil, the Russian Federation and South Africa). However, market growth in emerging economies has also led to shifting end markets in GVCs, as more trade has been South-South, especially since the 2008–09 economic recession (Staritz et al., 2011). China has been the focal point for both patterns since it is the world's leading exporter with an emphasis on manufactured goods, but it has also stoked the primary product export boom as the world's largest importer of a wide range of primary products.

The primary product exporting profiles of Brazil, the Russian Federation, and India (BRI) suggest that these countries are contributing to China's role as a materials processing and final assembly hub. Finished manufactured items are then exported from China back to these BRI countries and the rest of the world. Still, trade statistics cannot reveal where ownership, intellectual property (IP) and GVC coordination – and much of the profits in GVCs – lie. From case studies (Linden et al., 2007; Xing and Detert, 2010) and new research on trade in value-added (UNCTAD, 2013; Gereffi and Lee, 2012), we know that many of China's exports consist of foreign-branded products, contain core IP from industrialized countries (United States, Europe, Japan) and include sophisticated intermediate products imported from the most industrialized and advanced emerging economies such as the Republic of Korea and Chinese Taipei, as well as other developing countries in East Asia (Malaysia, Thailand, etc.). Thus, rising South-South trade may in fact signal the emergence of a GVC structure that undergirds China's role as "the world's workshop." This helps to explain efforts by the BRI countries to diversify away from primary commodities, first by adding more value to exported commodities, and second by moving into technology-intensive final products such as automobiles and electronics.

Various types of industrial policy are industry-specific. While this puts them in line for criticism when policymakers are seen to be "picking winners," the industry focus is essential. Research at the level of global industries clearly shows that the structure and upgrading trajectories of GVCs vary significantly, and, as a result, cross-industry comparisons are essential (Sturgeon et al., 2008; Cattaneo et al., 2010; Sturgeon and Kawakami, 2011; Staritz et al., 2011). For example, trade in customized intermediate goods is extremely high, growing and global in scope in electronics, while trade in automotive parts tends to be organized in regional production systems (North America, Europe, Asia), and trade in intermediate inputs to apparel products (fibre and fabric) is actually falling as the major apparel producing countries (for example China and Bangladesh) gain huge capabilities in textile production (Sturgeon and Memedovic, 2010). The reasons for these differences are complex. On the one hand, the detailed characteristics of product designs, intermediate components, final goods and logistics requirements greatly influence the geography of industry GVCs (Gereffi et al., 2005). On the other hand, certain products (like autos) come with high levels of political sensitivity that drive production toward end markets (Sturgeon and Van Biesebroeck, 2010).

As the Brazil consumer electronics case suggests, the formation of industrial policy does not always begin with policy-makers "picking" industries but rather with attempts to improve

the performance of existing industries that link their country to the global economy. This involves a search for mechanisms that can capture investment and improve a country's value-adding position in highly mobile segments of GVCs that are already in the process of spreading to new locations or may already be present in the jurisdiction that policy makers are responsible for. When Brazil's policy-makers try to capture more local value-added in local markets that are already growing rapidly, they cannot be said to be picking winners.

Of course, policy-makers must also be concerned with slowing market growth by raising prices to levels that block consumers' access to leading-edge products. Broad economic growth can be slowed when markets for products that make the whole economy more efficient, such as smart phones and computers, are truncated. Yet it is possible for policies that pressure lead firms to add more value locally to be modest and targeted enough so that they do not raise prices to the point where market growth is impeded, and leading-edge products fail to make it into the hands of the businesses and consumers that want them.

Once the proposition that a balanced approach is possible is accepted by policymakers, the question then becomes how to craft effective GVC-oriented industrial policies. One way to examine this question is to ask how current industrial policies differ from traditional industrial policies. A superficial analysis of the Brazilian consumer electronics case might suggest that the motivations and policy tools being employed by large emerging economies simply replicate many of the features of traditional ISI industrial policy: driving import substitution with local content requirements, instituting requirements for investment in local R&D and stimulating demand in key product areas.

However, we see three major differences that highlight the distinctive nature of GVC-oriented industrial policies:

1. **Global suppliers** – Instead of merely demanding that lead firms make major investments, the GVC-oriented industrial policies described in this paper reveal an increasingly sophisticated understanding of the global-scale patterns of industrial organization that have come to the fore in GVCs since at least the 1990s. Lead firms are relying on global suppliers and intermediaries for an array of processes, specialized inputs and services and demanding that their most important suppliers have a global presence. Hence it is suppliers, not lead firms, which are making many of the new investments that developing countries are seeking to capture. In many cases, suppliers generate the bulk of exports as well. Furthermore, the largest suppliers serve multiple customers, so the success of investments is not necessarily tied to the success of any single lead firm.⁵ In the context of rapidly

shifting market share among lead firms and the sudden entry of new players (neither Apple nor Google participated in the mobile communications industry before 2007), the capability to serve multiple customers takes on heightened importance. Therefore, it is no accident that Brazil sought investments from Foxconn, rather than Apple, in its desire for iPhones and iPads to be produced in the country for domestic consumption and export elsewhere in Latin America.

2. **Global sourcing and value chain specialization** – Policies that promote linkages to GVCs have very different aims from traditional industrial policies that intend to build fully blown, vertically integrated domestic industries. Policies can target specialized niches in GVCs. These can be higher-value niches suited to existing capabilities. They can also be generic capabilities that can be pooled across foreign investors. Either of these can serve both domestic or export markets. This sort of value chain specialization assumes an ongoing dependence on imported inputs and services. Reliance on global sourcing means that the entire value chain may never be captured, but it also assures ongoing involvement in leading-edge technologies, standards and industry “best practices.” Clearly, industries in developing countries can no longer make outmoded products. As the Brazilian mobile phone case shows, consumers with rising incomes will no longer accept them.
3. **Moving to the head of GVCs** – Encouraging global suppliers to establish facilities within a country can have long-term advantages. Local lead firms can rely on global suppliers in their midst and on broader industry GVCs for a wide range of inputs and services, from design to production to logistics to marketing and distribution. This can lower risk and barriers to entry for local firms, provide access to capabilities and scale that far outstrip what is available domestically and ensure that products and services are up to date, precisely because they participate in GVCs from the beginning. As long as policies have not driven costs above world norms, up-to-date, world-class products and services also open up export markets.

The use of industrial policies by emerging economy policymakers should not come as a big surprise. Both developed and developing countries have used these policies in the past and often with considerable sophistication as in the case of East Asian economies such as Japan, the Republic of Korea, Singapore, Chinese Taipei and now China.

There are two GVC-related features of emerging economies that are distinctive today. First, there is the centrality of China. A number of natural resource-based emerging economies such as Brazil, South Africa and the Russian Federation see China's procurement policies as limiting their ability to add value to their raw material

exports, whereas manufacturing powers such as the Republic of Korea, Mexico and to a lesser degree India see China as their most formidable competitor in both export and domestic markets. Second, the flourishing of GVCs has led intermediate goods exports to exceed the total of final and capital goods exports for the first time. This raises a new competitiveness challenge over who wins the “trade in value added” battle. Countries now seek to capture the highest value segments of GVCs, not only to increase total exports but also to provide local firms with access to world-class inputs. Thus, GVC-oriented industrialization and GVC-oriented industrial policies appear to be elements of the current industrial landscape that are here to stay.

Endnotes

1 Jim O'Neill (2011), the Goldman Sachs executive who coined the term BRIC in 2001 to refer to Brazil, Russia, India and China, now argues that there is a much larger number of “growth economies” (BRICs plus 11) that fall into this category. These include the MIST nations (Mexico, Indonesia, Republic of Korea and Turkey), and other periodic high-performers such as Bangladesh, Egypt, Pakistan, Philippines and Viet Nam (Martin, 2012). The original BRIC classification was extended to BRICS with the addition of South Africa in 2010. For purposes of this paper, the origin of these acronyms is less important than the collective effect of this set of so-called emerging economies, which are reshaping both supply and demand in many GVCs.

2 However, Lall's categories only cover goods, and India is also the world leader in exports of offshore services, with 45 per cent of the global total (see Fernandez-Stark et al., 2011).

3 Two recently announced international databases will permit us to examine the domestic versus foreign (imported) content of value added in export production. The first comprehensive effort is the OECD-WTO Trade in Value Added (TiVA) database, which presents indicators for 40 countries (all OECD countries, Brazil, China, India, Indonesia, Russian Federation and South Africa) covering the years 2005, 2008 and 2009 and broken down by 18 industries (see <http://www.oecd.org/industry/ind/measuringtradeinvalue-addedanoecd-wtojointinitiative.htm>). In addition, there is the UNCTAD-Eora GVC database, which was launched in February 2013, and it covers 187 countries during the 1990-2010 period for 25-500 industries, depending on the country (UNCTAD, 2013).

4 This is particularly clear in the case of Brazil's soybean exports to China, discussed in the next section of this paper.

5 By serving multiple customers, global suppliers can generate enough business to justify capital-intensive investments that have high minimum scale requirements, such as electronic displays and automated production lines.

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15

How have production networks changed development strategies in East Asia?

Fukunari Kimura

15.1. Production networks in East Asia

Production networks in East Asia, a result of “the second unbundling”, are currently the most advanced in the world, particularly in machinery industries¹ A new type of international division of labour has fundamentally changed the development strategies of less developed countries (LDCs) as well as developed countries’ (DCs) approach to LDCs.

“Global value chains” and “production networks” are similar concepts that certainly overlap but also hold differences in what they emphasize. The concept “production networks” emphasizes speed and tight coordination among production blocks through swift service links. Speed and tight coordination can be realized only in a limited number of countries, and this is linked to the locational choices of production blocks, in keeping with international trade theory. Speed and tight coordination are found typically at the regional level such as in East Asia, rather than globally. The concept of “the second unbundling” (Baldwin, 2011) also emphasizes speed and tight coordination. This paper describes the concept in parallel with “production networks” in order to deal with quick, high-frequency, synchronized transactions in the manufacturing sector.

Global value chains in textiles and garments are typically linked by slow, low-frequency and loosely synchronized transactions and are qualitatively different from production networks in the machinery industries that have developed in East Asia since the beginning of the 1990s. Further, even among production networks, there has been a big jump from simplistic “cross-border production sharing” to production “networks” with sophisticated combinations of intra-firm and arm’s length (inter-firm)

transactions. East Asia has arrived at a stage of development where international fragmentation of production and the formation of industrial agglomerations are occurring at the same time. Production networks in East Asia have reached a higher stage of development than in other parts of the world such as Latin America and Eastern Europe.

This paper discusses how such changes in the North-South division of labour transform development strategies in LDCs as well as the responses to such transformation by the DCs. In LDCs, production networks enable latecomers to jump-start industrialization. The initiation of industrialization becomes much easier and quicker than in the regime of the industry-by-industry international division of labour or “the first unbundling”. After reaching a certain level of income and forming industrial agglomerations, understanding how to take advantage of positive agglomeration effects becomes imperative in order to design the latter half of the development strategies and to make the transition from middle-income to fully developed economies.

In DCs, de-industrialization is always a concern, but the “second unbundling” provides opportunities to generate domestic economic activities rather than losing jobs, possibly resulting in delaying de-industrialization. Both for LDCs and DCs alike, production networks may work as a shock transmission channel once a massive shock occurs somewhere in the world. At the same time, because of a strong incentive for private firms to keep production links alive, production networks may work as a part of greater macroeconomic stabilizers. Such attributes of production networks certainly influence policies in both LDCs and DCs. In the end, in East Asia, LDCs are on the way to implementing a full set of new development strategies, and DCs are aggressive in foreign operations in order to gain international competitiveness and generate domestic employment.

The next three sections of this paper are devoted to the impact of production networks on the LDCs. Section two discusses the implications for production networks at the early stage of development in enabling a jump-start of industrialization. Section three examines development stages at middle-income levels in which industrial agglomeration starts to take shape. Section four employs two-dimensional fragmentation theory and systematically presents policies to effectively utilize fragmentation and agglomeration. Section five presents the possibility of delaying de-industrialization in DCs by effectively utilizing the mechanism of production networks. Section six argues that production networks may transmit negative waves when large shocks such as the global financial crisis and the East Japan earthquake occur anywhere in the world. Yet, at the same time, firms try to keep linkages in production networks and resume them as soon as

possible, resulting in the stability and resiliency of production networks. Section seven concludes the paper.

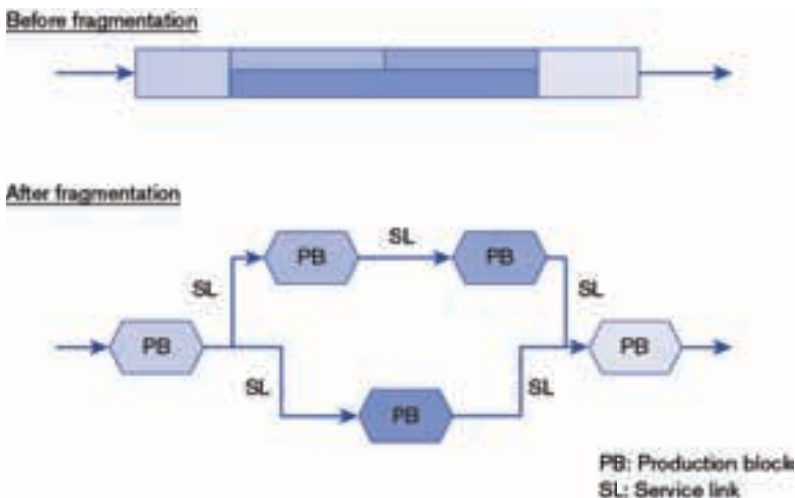
15.2. Jump-starting industrialization and the narrowing of development gaps

The mechanics of production networks allow a jump-start of industrialization at the early stage of development. This changes early-stage development strategies in a substantial way. Further, it results in narrowing development gaps between countries and regions.

The essence of fragmentation theory by Jones and Kierzkowski (1990) is illustrated in Figure 15.1. A firm may reduce the total cost of production by fragmenting some production processes and tasks into production blocks and by locating them in different places. The condition for the fragmentation of production is that the saving of production costs *per se* in production blocks is larger than enhancing the costs of service links that connect remotely located production blocks.

Diversified location advantages based on different stages of development may provide savings in production costs. Differences in wages, land prices and possibly some advantageous policies can be the source of locational advantages. In East

FIGURE 15.1: The fragmentation theory: production blocks and service links



Source: Jones and Kierzkowski (1990).

Asia, there exist huge differences in development stages, which generate a condition advantageous for fragmentation.

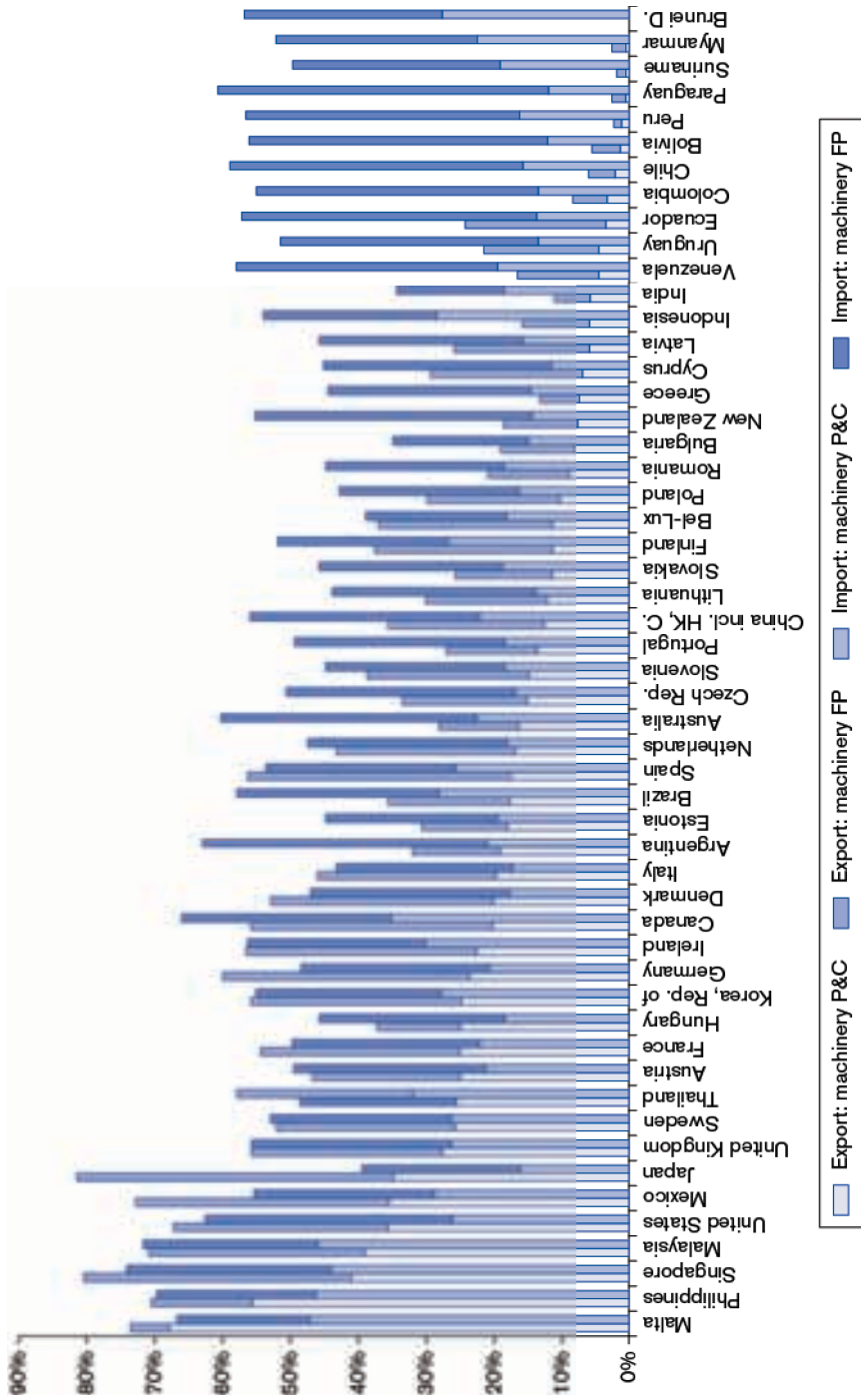
Of course, not all LDCs can automatically enter into production networks. Low wages are certainly a source of attraction. However, if other local conditions are too bad, it does not work. To participate in production networks, the minimal set of locational advantages and low service-link costs are necessary. Minimally required location advantages include electricity supply, industrial estate services and decently functioning investment hosting agencies. These, however, do not have to be perfect all over the country. For example, a country can start out with spotty, ad-hoc arrangements limited to special economic zones. Service link costs consist of costs for transportation, telecommunication and for various kinds of coordination. In the case of the transportation of parts and components, monetary costs, time costs and the reliability of logistics links are all crucial to participate effectively in production networks.

A number of East Asian developing economies have taken advantage of the mechanics of production networks and have successfully started up industrialization. Singapore, Malaysia, Thailand and the Philippines went through this process by the late 1980s and early 1990s. China accelerated the process of participating in production networks, particularly from 1992. Indonesia, Viet Nam and India began the process in the mid-1990s and 2000s. Cambodia, Lao P.D.R. and Myanmar are now about to start industrialization.

Figures 15.2 and 15.3 present the ratios of machinery and machinery parts and components to total manufacturing exports and imports in selected countries in the world in 1994 and 2007. The machinery trade includes trade in HS84-92, or the sum of general machinery, electric machinery, transport equipment and precision machinery. Machinery parts and components are defined by our own definition (Kimura and Obashi, 2010). The ratio of machinery parts and components in total manufacturing exports is a good indicator for the degree of participation in production networks with quick and high-frequency transactions. A number of East Asian developing countries such as the Philippines, Singapore, Malaysia and Thailand have high ratios of machinery parts and components exports. China rapidly enhanced this ratio during the period between 1994 and 2007. Countries such as Viet Nam and Indonesia are still in the process of entering into production networks.

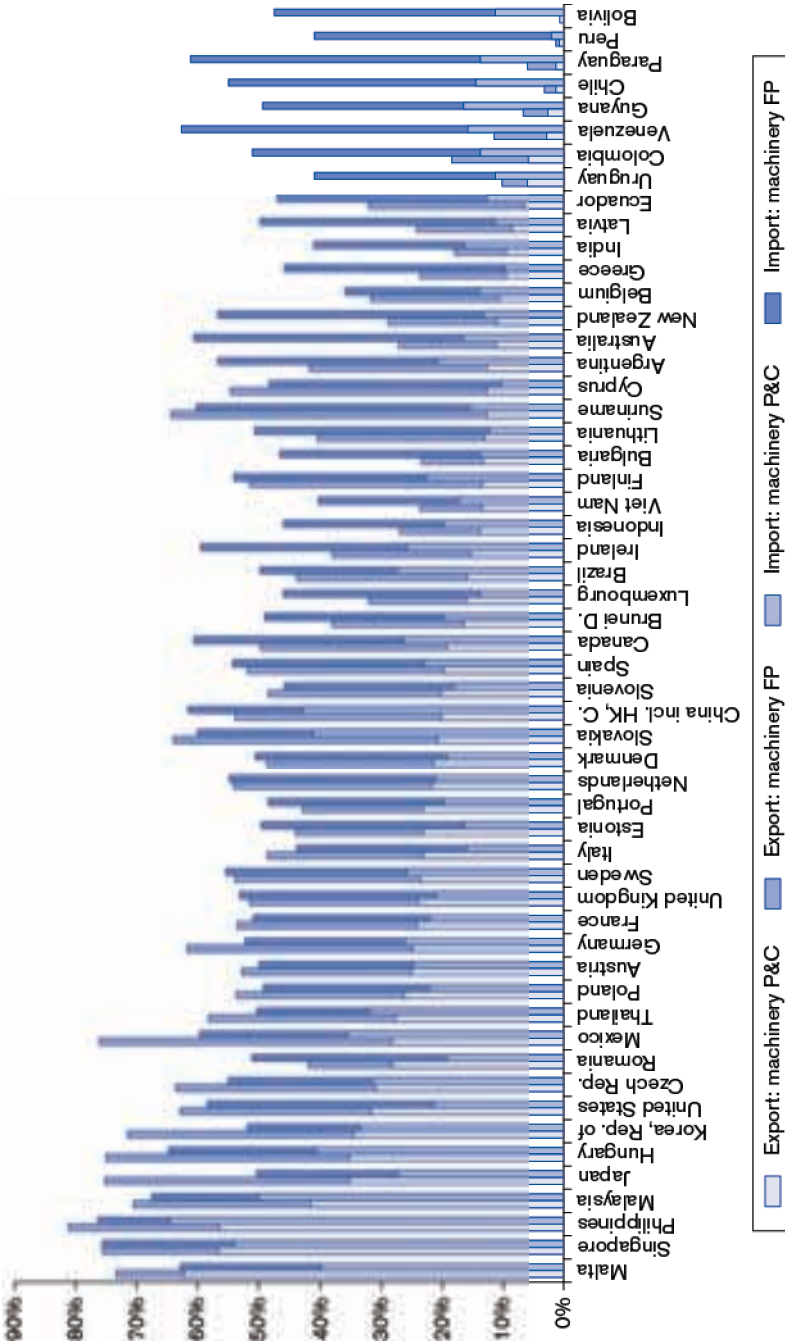
Production networks with quick and high-frequency transactions so far cover only a limited number of countries and regions. Figure 15.4, the data compiled by the

FIGURE 15.2: Shares of machinery in total manufactured exports/imports to/from the world, 1994



Source: Kimura and Obashi (2010).

FIGURE 15.3: Shares of machinery in total manufactured exports/imports to/from the world, 2007

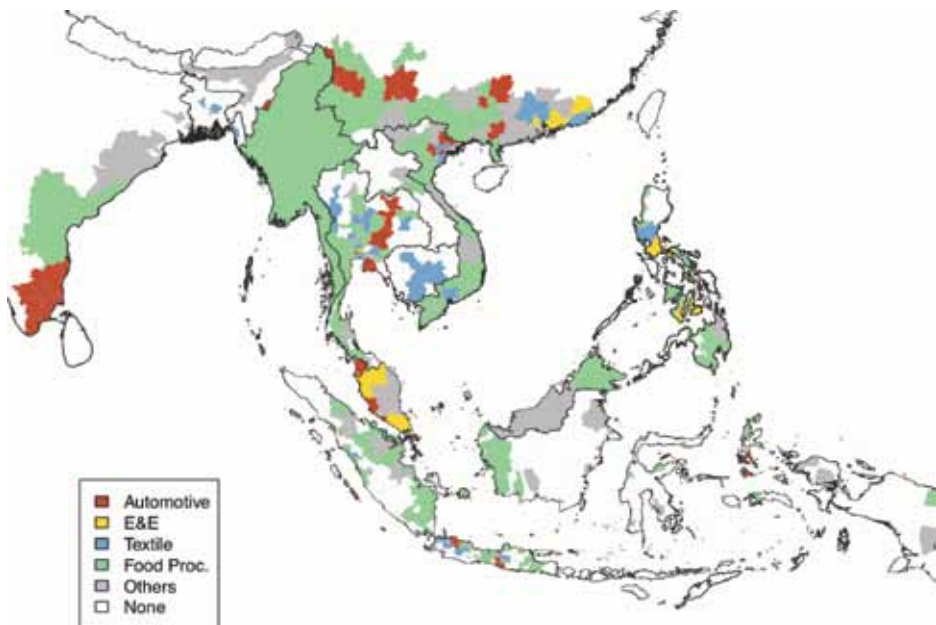


Source: Kimura and Obashi (2010).

IDE-JETRO ERIA team, maps the location of manufacturing subsectors in ASEAN and the surrounding areas, based on provincial-level data. They first check whether the manufacturing value-added is greater than 10 per cent of gross regional products and, if so, pick up the largest manufacturing subsectors: automobiles, electric and electronics, textiles and garments, food processing and other manufacturing. Automobiles and electric and electronics industries are geographically distributed in a highly skewed pattern. Although machinery industries may require certain levels of population size, we still see a lot of potential for production networks to expand their boundaries, and the location of machinery industries may well become more diversified in the future.

There is clear evidence that production networks' frontiers have continuously pushed out into developing countries. Ando (2012) analyses intensive and extensive margins of machinery trade among the East Asian countries and finds that extensive margins of exports and imports by CLMV (Cambodia, Lao P.D.R., Myanmar and Viet Nam) have been significantly increased since 2007.

FIGURE 15.4: Location of manufacturing sub-sectors, 2005



Source: ERIA (2010).

What happens when a country begins to industrialize from diverse locations such as in industrial estates or special economic zones? First, a country establishes production blocks, rather than a whole industry. It is much easier to prepare a minimal set of locational advantages than to foster an entire industry. Once production blocks commence, multinational enterprises (MNEs) can obtain local information to allow investment set-up costs to be drastically reduced. Host countries become accustomed to MNEs and learn how to deal with them. By listening to their complaints, troubleshooting becomes possible and the investment climate will thus improve. If necessary infrastructure and institutional arrangements are prepared along the way, more and more production blocks may be attracted.

This early development strategy is fundamentally different from infant industry protection or import-substitution strategies, with or without foreign direct investment (FDI) applied by Japan, the Republic of Korea or Chinese Taipei in the 1950s to 1970s.

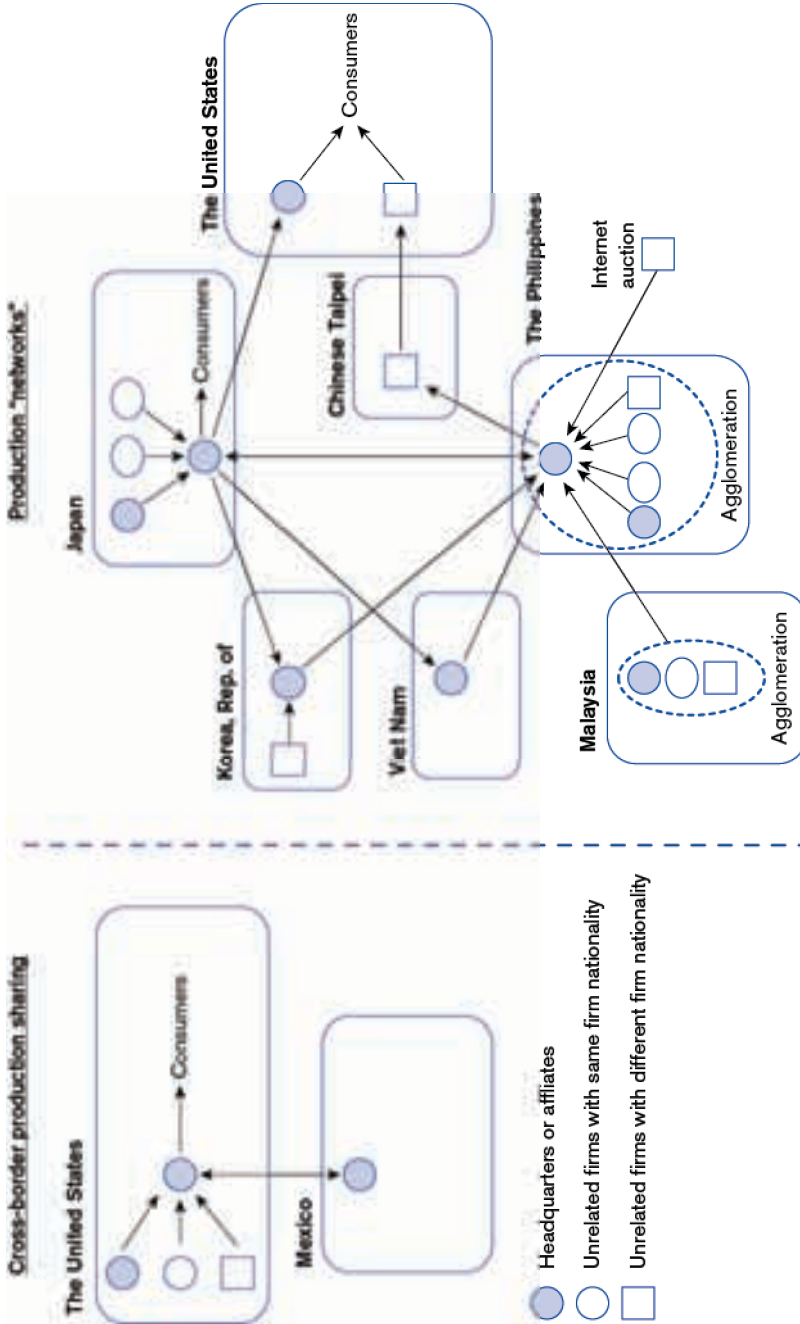
The mechanics of production networks move production blocks from advanced areas to those that lag behind. Production networks actually help address development gaps between countries and regions and achieve geographical inclusiveness for East Asia. In the past 15 years, CLMV actually had higher economic growth rates than ASEAN as a whole.

15.3. Industrial agglomeration and middle-income development strategy

Some East Asian developing countries have been successful in starting up industrialization by fully utilizing the mechanics of production networks and they have now attained middle-income levels. Today, the issue has become how to make the transition from a middle-income to a fully developed economy. If we simply extrapolate GDP per capita, a number of East Asian developing countries including Malaysia, Thailand, China, Indonesia and the Philippines may reach US\$ 10,000 or higher within 10 to 15 years. Such simplistic macroeconomic growth cannot be automatic. Indeed, it will certainly require substantial economic transformation.

The strength of East Asia lies in the formation of its industrial agglomerations. Production networks in the region have reached a new stage of development (Figure 15.5). Fragmentation of production between the United States and Mexico, on the other hand, mostly consists of “cross-border production sharing” in which

FIGURE 15.5: Cross-border production sharing and production “networks”

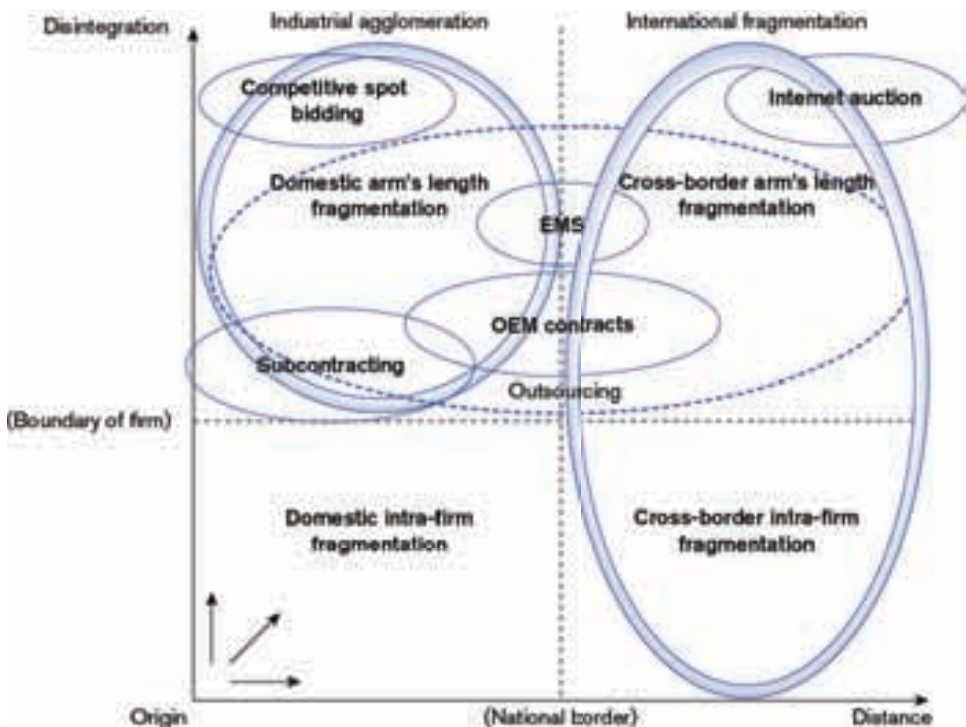


Source: Ando and Kimura (2010).

transactions can be characterized mainly as simple “go and come back” ones, and these transactions remain typically intra-firm ones. Fragmentation between Western and Eastern Europe has so far remained at a similar stage of development. Yet, in the case of East Asia, many countries and regions are involved, interlinked by a sophisticated combination of both intra-firm and arm’s length (inter-firm) transactions, and it has truly become a “network.” There is a tendency for intra-firm transactions to be long-distance ones while arm’s length transactions are limited to shorter distances due to high transaction costs (Kimura and Ando, 2005). This generates one of the major forces forming industrial agglomerations in East Asia.

Kimura and Ando (2005) propose the concept of two-dimensional fragmentation where fragmentation of production is defined by the dimension of geographical distance and the dimension of disintegration, at both intra-firm or arm’s length levels (Figure 15.6). Thus, in East Asia, the upper part of the figure, various types

FIGURE 15.6: Two-dimensional fragmentation



Source: Kimura and Ando (2005).

of outsourcing, appears proliferated. In particular, the northwest part of the figure corresponds to industrial agglomeration.

How to take advantage of industrial agglomerations? First, once a certain level of industrial agglomeration has been formed, industrial structure becomes stabilized to some extent. Fragmented production blocks are footloose by nature and thus tend to move outwards when the original locational advantages such as an abundance of low-wage workers have faded. However, if transactions within industrial agglomeration are flourishing, positive agglomeration effects generate another type of locational advantage, and production blocks may remain. In this sense, a country can gain some extra time to transform its industrial structure.

Second, local firms and local entrepreneurs may have a good chance to participate in production networks run by multinationals. Although it depends on the industry and the corporate strategy of the multinationals, local parts suppliers tend to enjoy price competitiveness vis-à-vis multinational parts producers. Their weaknesses are rather typically non-price competitive such as inconsistent product quality, a lack of preciseness in delivery timing and credibility in general. Once local firms gain overall competitiveness close to the threshold of participating in production networks, MNEs are willing to help them upgrade their capabilities and invite them into such networks.²

Third, contact with MNEs is one of the most important channels for local firms to gain access to technological information. In particular, once local firms join production networks and have transactions with MNEs, the MNEs are sometimes even willing to transfer technology and managerial know-how to them, helping to upgrade local firms' innovation, from process innovation and market access information to product innovation.³

Heavy dependence on MNEs works well during the first half of the industrialization process. In the latter half, however, a country must address its own weaknesses. Of particular importance is the development of human capital. Industrial transformation requires massive numbers of scientists and engineers. Compared with the Republic of Korea and China, ASEAN has been slow to respond to the demand for human capital. Another missing element is R&D stock. Table 15.1 presents the ratios of R&D expenditure to GDP. These ratios are still extremely low, except in Singapore and Malaysia.⁴

TABLE 15.1: Research and development expenditure (% of GDP) in ASEAN and other East Asian countries

Indonesia (2001)	Malaysia (2002)	Singapore (2002)	Thailand (2002)	Philippines (2002)	Brunei D. (2002)	Cambodia (2002)	Lao PDR (2002)	Myanmar (2002)	Viet Nam (2002)
0.048	0.653	2.153	0.244	0.146	0.016	0.0450	0.036	0.162	0.193
China (2002)	India (2002)								
1.070	Japan (2002)			Korea, Rep. (2002)			India (2002)		
	3.165			2.404			0.737		

Notes: Expenditures for research and development are current and capital expenditures (both public and private) on creative work undertaken systematically to increase knowledge, including knowledge of humanity, culture, and society, and the use of knowledge for new applications. R&D covers basic research, applied research, and experimental development.

Data source: World Bank – World Development Indicators (WDI).

Source: ERIA (2012b).

Bangkok, more than 40 industrial estates are located within a 100 km diameter, and a just-in-time procurement system can be set up with just two- to 2.5-hour drive times. To operate the system well, mass physical infrastructure is essential, which includes logistic infrastructure such as a highway network, a large-scale container port and a major airport as well as other economic infrastructure including electricity supply and industrial estate services. The Pearl River delta and Shanghai's environs have about the same geographical size. Jakarta and Manila are large in terms of population but have not yet developed infrastructure to support this scale of industrial agglomeration. Ho Chi Minh City and Hanoi also require infrastructure support, and the recent hikes in wages and land prices there due to insufficient infrastructure prevent them from effectively mobilizing human resources from rural to urban locations.

The "middle-income trap" has recently been a popular subject within the development community and in this regard East Asia shares similar challenges with other parts of the world. However, fragmentation and agglomeration in the manufacturing sector in East Asia have created characteristics distinctive from those of other regions. Understanding how to utilize the advantages of industrial agglomerations and overcome a heavy dependency on multinationals is among the prime issues confronting the region and its desire to step up from a middle-income to a fully developed economy.

15.4. Policies to utilize forces of fragmentation and agglomeration

The past two sections of this paper presented how production networks have generated a new development strategy in East Asia. Required policy reform for the development strategy is shown in the framework of the two-dimensional fragmentation (Table 15.2).

The costs of fragmenting production can be grouped into three categories: network setup costs, service link costs and production costs *per se*. To initiate or further enhance production networks, there typically exist some bottlenecks to be resolved in terms of these costs. On the other hand, there are two dimensions of fragmentation: fragmentation in geographical distance and particularly international fragmentation; and fragmentation in disintegration linked with the formation of industrial agglomerations.

The upper section of the table is particularly important to a country starting industrialization. Various policy modes beyond simplistic tariff removal are listed,

which contrasts policy requirements for the second unbundling with those of the first unbundling. We also note that some of them can be covered by high-level free trade agreements (FTAs) while others belong to a development agenda outside international commercial policies. The lower section of the table becomes crucial to a country after forming industrial agglomerations.

This policy framework has become the basis of ASEAN and East Asian economic integration. The ASEAN Economic Community (AEC) Blueprint and its mid-term review (ERIA, 2012a) have set clear priorities on policy modes conducive to production networks. The contents of economic integration include a wide range of international commercial policies as well as a development agenda. The framework of East Asian FTA or the Regional Comprehensive Economic Partnership (RCEP) is also likely to apply such a framework based on the negotiation template proposed by ASEAN.

15.5. Delaying de-industrialization in DCs

Production networks have also changed the attitude of DCs in East Asia. In the journalistic literature in North America and Europe, outsourcing or offshoring is often criticized because it is supposed to reduce employment at home. Even in the academic literature, outsourcing or offshoring is treated as a threat to developed countries' economies (Blinder, 2006; Samuelson, 2004). The popular conception is that when

TABLE 15.2: Policies for a new development strategy

	Reduction in network set-up cost	Reduction in service link cost	Reduction in production cost per se
Fragmentation in geographical distance (par. For International fragmentation)	<ul style="list-style-type: none"> Investment facilitation/promotion 	<ul style="list-style-type: none"> Institutional connectivity (tariff removal, trade facilitation, ...) Physical connectivity (hard and soft logistics/ ICT infrastructure development) 	<ul style="list-style-type: none"> Liberalization of production-supporting services Investment liberalization Upgrading infrastructure services such as electricity supply and EPZs
Fragmentation in disintegration (linked with the formation of industrial agglomeration)	<ul style="list-style-type: none"> Business matching between multinationals and local firms 	<ul style="list-style-type: none"> Reducing transaction cost in economic activities Convergence/harmonization of economic institutions and legal system 	<ul style="list-style-type: none"> Enhancing agglomeration effects through SME development Strengthening innovation

Source: Authors' compilation.

a firm moves labour-intensive activities from DCs to LDCs, it lays off workers, scraps factories and then sets up new ones in LDCs.

However, such criticism is scarce in Japan. Many people in Japan, both capitalists and labour, believe that the globalization of Japanese firms, particularly in the context of production networks in East Asia, has been good for the Japanese economy. If a firm successfully sets up a proper international division of labour between North and South, it can actually enlarge its domestic operation and even increase employment. At least at the firm level, fragmentation may actually generate domestic employment in Japan.

There is empirical evidence supporting this. Ando and Kimura (2007, 2012b) show that Japanese manufacturing firms that increase the number of their affiliates in East Asia enlarge domestic employment and operations relative to other Japanese manufacturing firms, no matter whether in normal periods or during a crisis.⁵ Table 15.3 summarizes changes in domestic employment in 1998–2002, 2002–06 and 2007–09 by Japanese manufacturing firms. Although the long-term trend of Japanese manufacturing employment is one of gradual shrinkage, the firms that expand their operations in East Asia tend to “relatively increase” domestic employment compared with the firms that do not. This tendency is even stronger in the case of small and medium enterprises (SMEs) defined as firms with less than 300 domestic employees. By controlling for various firm-level characteristics, the econometric analysis confirms that the firms that expand their operations in East Asia generate domestic employment compared with the firms without operations in East Asia by 4.3 per cent, 6.6 per cent and 3.6 per cent respectively over the periods 1998–2002, 2002–06 and 2007–09.

We should note that the long-term trend still seems to be one of de-industrialization. In particular, after the recent global financial crisis, some signs of narrowing the scope of domestic manufacturing activities are observed in a relative shrinkage of manufacturing activities (Ando and Kimura, 2012b) and a permanent reduction in the extensive margins of Japanese exports (Ando and Kimura, 2012a). It is, however, still important to recognize that globalizing corporate activities can generate domestic operations and jobs if proper job demarcation between domestic and foreign operations is established. The Japanese government, both central and local, has continuously promoted further globalization of Japanese firms, particularly in the context of their expanding operations in East Asia.

A positive perception of production networks also affects Japan's strategy regarding East Asian economic integration. Although Japan's overall FTA strategy has been

TABLE 15.3: Changes in domestic operations in the period 1998–2002 and 2002–2006 by the type of firms, based on the two-year-balanced panel data

The type of firms	1998–2002			2002–2006			2007–2009		
	Share of firms increasing	Average growth rates at the firm level	Aggregate change	Share of firms increasing	Average growth rates at the firm level	Aggregate change	Share of firms increasing	Average growth rates at the firm level	Aggregate change
(a) Manufacturing firms									
No entry in East Asia	32%	-3.7%	-128,527	51%	5.2%	60,913	41%	-0.5%	-3,500
Expansion in East Asia (i+ii)	33%	-4.2%	-160,084	64%	12.6%	116,235	52%	2.8%	-9,579
- (i) Expansion in East Asia	29%	-8.1%	-142,988	62%	10.1%	99,970	53%	2.5%	-10,996
- (ii) Expansion in East Asia (with first FDI in the region)	38%	0.2%	-17,096	67%	16.1%	16,265	50%	3.3%	1,417
Steady in East Asia	25%	-9.3%	-69,561	54%	4.5%	13,861	43%	-1.4%	-1,773
Shrinkage in East Asia	23%	-10.2%	-104,182	48%	2.2%	-35,154	40%	-3.9%	-5,576
Shrinkage in East Asia (withdrawal from the region)	29%	-9.7%	-9,708	52%	0.7%	-5,561	33%	-6.5%	-2,487
Total	32%	-4.3%	-472,062	53%	6.0%	150,294	42%	-0.6%	-20,428

(Continued)

TABLE 15.3: (Continued)

The type of firms	1998–2002			2002–2006			2007–2009		
	Share of firms increasing	Average growth rates at the firm level	Aggregate change	Share of firms increasing	Average growth rates at the firm level	Aggregate change	Share of firms increasing	Average growth rates at the firm level	Aggregate change
(b) Manufacturing SMEs									
No entry in East Asia	33%	-2.7%	-38,565	52%	6.0%	40,767	39%	-0.7%	-8,233
Expansion in East Asia (i+ii)	45%	2.1%	344	67%	16.9%	12,769	43%	1.3%	425
– (i) Expansion in East Asia	46%	0.5%	-92	63%	12.5%	4,461	40%	-0.9%	-117
– (ii) Expansion in East Asia (with first FDI in the region)	44%	2.7%	436	70%	19.6%	8,308	45%	3.0%	542
Steady in East Asia	30%	-7.2%	-5,588	58%	5.8%	3,060	38%	-2.1%	-3,380
Shrinkage in East Asia	28%	-10.9%	-665	56%	13.6%	899	34%	-5.2%	-1,762
Shrinkage in East Asia (withdrawal from the region)	34%	-5.7%	-847	54%	0.9%	-79	32%	-6.7%	-970
Total	34%	-2.6%	-44,586	54%	6.7%	57,416	39%	-0.9%	-12,950

Source: Ando and Kimura (2012b).

partly hampered by the notorious agricultural lobby, clear priorities have been placed on policy modes conducive to production networks. Japan's participation in the Trans-Pacific Strategic Economic Partnership Agreement (TPP) is regarded as an inevitable step towards realizing an international economic environment favourable to production networks, particularly through high levels of liberalization in terms of tariffs, services, investment and intellectual property rights protection. TPP, however, will not cover all the policy modes for ASEAN and East Asia. Trade, services and investment facilitation as well as a varied development agenda including infrastructure and SME development is considered to be the task of East Asian economic integration.

15.6. Stability and resiliency against macro shocks

An often-claimed concern regarding committing ourselves to production networks in both LDCs and DCs is that production networks may work as a shock transmission channel once a massive macro shock occurs somewhere in the world. Production networks aggressively take advantage of differences in locational advantages and connect separately located production blocks by tight service links. When a negative shock affects part of the production networks, it will necessarily influence the whole system.

In the case of the global financial crisis starting in 2008, a massive negative demand shock came up through the value chain from downstream, affecting all production networks in East Asia. In the case of the East Japan earthquake and the disastrous flooding in Thailand in 2011, part of the supply chain was disrupted and supply shocks were transmitted through production networks.

However, these shock transmissions should not be confused with financial contagion. A financial crisis shakes the credibility of the entire financial system, whose weaker parts are prone to be attacked, and a wide range of financial sectors in multiple countries may be exposed to contagion. On the other hand, shocks in production networks do not carry such a risk of contagion. Rather, private companies make every effort to minimize a shock and keep production networks working well.

Transactions in production networks are indeed more stable and resilient against shocks than other types of transaction. Ando and Kimura (2012a) employ by-destination data of Japanese exports at the HS nine-digit level and decompose a drop and recovery of export values into intensive and extensive margins in the global financial crisis and the East Japan earthquake. They find that trade in machinery

parts and components within East Asia is less likely to be interrupted and more likely to recover than are other types of international trade. Private companies try hard to maintain quick, high-frequency synchronized production networks. This result suggests that production networks may rather work as a macroeconomic stabilizer against shocks.

One important observation is that even after the East Japanese earthquake and the massive flooding in Thailand, private companies did not go back to the pre-fragmentation system of production. They made various efforts to strengthen control of the entire production network and to establish back-up channels to some extent. These efforts however are certainly costly, and there are tradeoffs between the benefits of fragmented production and the insurance against shocks. Policy debates do not focus on pulling back from production networks but rather on how to strengthen geographical links extended in East Asia.

15.7. Conclusion

Production networks of the second unbundling in the manufacturing sector in East Asia are currently the most advanced in the world and present fundamentally different development strategies for LDCs. The first half of these development strategies is pretty well established. By participating in production networks through resolving bottlenecks, LDCs can jump-start industrialization. The latter half of these development strategies is still in uncharted territory. How to step up from a middle-income to a fully developed economy is a challenge that relatively advanced parts of East Asia face, although the strength of having industrial agglomeration should certainly be effectively utilized.

Changes in the nature of the North-South division of labour also affect DCs' attitudes toward globalizing corporate activities. Moving labour-intensive activities to LDCs does not necessarily mean the loss of domestic employment. If a firm successfully sets up an efficient division of labour between LDCs and DCs, it can even generate domestic economic activities and employment. This is instinctively perceived as a way of enjoying trickle-down benefits from East Asian economic dynamism.

Linking to the globalizing world is necessarily accompanied by risks of exposure to various shocks. However, differences between shocks transmitted through production networks and arising from financial links have been well recognized, and the stability

and resilience of production networks have increasingly been appreciated rather as a stabilizing factor.

Production networks and the second unbundling have changed the nature of the North-South division of labour. East Asia is about to present a new model for the world.

Endnotes

- 1 In this paper, East Asia includes ASEAN plus three Northeast Asian countries (Japan, the Republic of Korea and China) and, sometimes, Chinese Taipei.
- 2 Vo et al., (2010) conduct a questionnaire survey and examine the characteristics of local firms that determine whether they can participate in production networks or not.
- 3 Intarakumnerd and Ueki (2010); Intarakumnerd (2011) and Sunami and Intarakumnerd (2011) investigate what sort of technological information is obtained through which channels as well as how firms can upgrade their innovation by conducting extensive questionnaire surveys.
- 4 For the Republic of Korea and China, more recent data presents more than 3 per cent and 2 per cent, respectively.
- 5 Hijzen et al., (2007) obtain similar results for new entrants to foreign investment, using the propensity score matching technique.

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16 Expansion of global value chains in Asian developing countries

Automotive case study in the Mekong subregion

Masato Abe

16.1. Introduction

During the past three decades, the development of highly integrated global value chains in which products are supplied, manufactured and distributed across national boundaries have created a new form of division of labour among Asian economies, especially in North-East and South-East Asia (IDE-JETRO and WTO, 2011). The rapid growth of global value chains has dramatically changed production patterns, international trade and foreign direct investment (FDI) in the region, with a notable expansion of intra-regional trade through multiple border crossings of parts and components (ESCAP, 2009).

While an increasing number of literatures have examined the global value chain phenomenon in Asia (ESCAP, 2007; 2009), little attention has been paid to its expansion from developing countries to less developed neighbours, such as least developed countries (LDCs) (Makishima, 2012). The lack of existing research and reliable national data has made an adequate review of global value chains in less developed countries particularly difficult.

Against this background, key research questions of this case study are proposed as follows:

- What are key drivers of global value chain, particularly in less developed countries?
- How do sectoral characteristics impact on the development of global value chains?
- How can public interventions accelerate the expansion of the global value chains in less developed countries?

The Mekong subregion (Figure 16.1),¹ which is part of South-East Asia and comprises five Mekong river basin countries (Cambodia, Lao People's Democratic Republic or

FIGURE 16.1: Mekong subregion



Source: www.adb.org.

Note: The boundaries and names shown and the designations used on this map do not imply official endorsement or acceptance by the United Nations.

Lao PDR, Myanmar, Thailand and Viet Nam) is the geographical focus of this study. The subregion provides valuable laboratories to explore these research topics since it has experienced a varied degree of economic development and includes a middle-income country (Thailand), a lower middle-income country (Viet Nam) and three least-developed countries (Cambodia, Lao PDR and Myanmar).

In the Mekong subregion, the automotive industry has been growing rapidly. Several major automakers have established production bases in Thailand and Viet Nam, and their supplier networks have been expanding into Cambodia, Lao PDR and Myanmar. The subregion has benefited from increased capital inflows, the creation of employment and human resource development. While the automotive industry operates within a single sector and shares a common frame of reference, the industry shows much diversity in terms of products and technologies, presenting diversified supply and production networks.

This study is based on both quantitative and qualitative analyses. Trade, foreign direct investment (FDI) and descriptive data are used to review the ongoing integration of the subregion into the global automotive value chains. The outcomes of three industrial surveys in the subregion (JETRO, 2009 and 2012; FPRI, 2012) are also reviewed to identify sectoral issues in the automotive industry. This article begins by examining the development of the automotive industry in the Mekong subregion and its key drivers. The characteristics of global automotive value chains are then identified, while covering the recent expansion of the automotive value chains within the subregion. The outcomes of the three industrial surveys are then discussed. Before concluding, policy implications are then presented.

16.2. Development of the automotive value chains in the Mekong subregion

The automotive industry, which covers all companies and activities involved in the manufacturing of automobiles, parts and components, is the largest global industrial sector with a total unit production of nearly 80 million in 2011 (OICA, 2012) and total sales of approximately US\$ 2.2 trillion in 2008 (FPRI, 2012). Its final products, parts and components are the second most-traded manufactured goods in the world after electronic appliances and equipment, accounting for approximately 7.5 per cent of world trade in 2010.² Automakers have adopted an expansion strategy in Asia, particularly given the maturing markets of the European Union, Japan and the United States, with growth coming particularly from Asian developing countries (FPRI, 2012).

Since the 1960s, Thailand has gradually emerged as the major production base of automobiles and intermediaries for both Japanese and Western automakers. Later, the 1980s and the 1990s saw a wave of assembly and supplier plant construction in Thailand and Viet Nam, respectively, as declining tariffs and transportation costs allowed for more flexibility in assembling vehicles and sourcing components from various countries. The establishment of assembly lines in Cambodia in the 2000s further strengthened this trend. Myanmar recently started the mass production of commercial vehicles. Currently, major suppliers have begun sourcing labour-intensive parts and components from Lao PDR.

Along the way, automakers have taken advantage of regional trade and investment liberalization, such as the ASEAN Economic Community (AEC)³ to develop production facilities in South-East Asia and enhance the division of labour within the region in order to achieve greater market access and economies of scale (Kohpaiboon and Yamashita, 2011).⁴ However, economic integration has also evolved beyond the geographical scope of ASEAN, building the formal economic partnership of ASEAN+6 with China, India, the Republic of Korea, Australia, Japan and New Zealand. Table 16.1 summarizes regional trade agreements pertinent to ASEAN and thus the Mekong subregion.

When looking at the current tariff schedules for automobiles and auto parts in the Mekong subregion (Table 16.2), the countries in the subregion, except for Lao PDR and Myanmar, have provided preferential tariff rates within ASEAN, although automobiles and auto parts appear on the sensitive list under the ASEAN Trade in Goods Agreement (ATIGA). Lao PDR and Myanmar apply flat rates with 122 per cent and 30 per cent, respectively, on both completely-built units (CBU) and complete knock-down (CKD) kits regardless whether it involves imports from within or outside ASEAN. For the category of intra-ASEAN imports of CBUs, Viet Nam applies the second highest rate with 70 per cent whereas the tariff rates of Cambodia and Thailand are significantly lower, with zero to five per cent and zero per cent, respectively. If the imported CBUs originate from outside ASEAN, then Cambodia, Thailand and Viet Nam use a 35 per cent, 80 per cent and 70–82 per cent tariff, respectively. While the same tariff rate is in place for both CBUs and CKDs in Cambodia, Thailand and Viet Nam apply higher rates on CKDs from outside ASEAN (30 per cent and 65–78 per cent, respectively). The applied tariff rates for auto parts range from zero per cent in Thailand, through zero to five per cent in Cambodia to five per cent in Viet Nam if the parts come from another ASEAN country. Otherwise, Cambodia charges seven to 15 per cent, Thailand five to 30 per cent and Viet Nam zero to 30 per cent. It is

TABLE 16.1: List of regional trade agreements including the Mekong subregion

Agreement	Coverage	Type	Date of entry into force	Current signatory	Composition of regional trade agreement	Subregion
ASEAN Free Trade Area (AFTA)	Goods	Free trade agreement	28 January 1992	Ten ASEAN countries	Plurilateral	South-East Asia
ASEAN Trade in Goods Agreement (ATIGA)	Goods	Free trade agreement	17 May 2010	Ten ASEAN countries	Plurilateral	South-East Asia
ASEAN – China	Goods and services	Partial scope agreement and economic integration agreement	Goods: 1 January 2005 Services: 1 July 2007	Ten ASEAN countries and China	Bilateral; one party is a regional trade agreement	East Asia and South-East Asia
ASEAN – Japan	Goods	Free trade agreement	1 January 2008	Ten ASEAN countries and Japan	Bilateral; one party is a regional trade agreement	East Asia and South-East Asia
ASEAN – Korea, Republic of	Goods and services	Free trade agreement and economic integration agreement	Goods: 1 January 2010 Services: 1 May 2009	Ten ASEAN countries and the Republic of Korea	Bilateral; one party is a regional trade agreement	East Asia and South-East Asia
ASEAN – Australia – New Zealand	Goods and services	Free trade agreement and economic integration agreement	1 January 2010	Ten ASEAN countries, Australia and New Zealand	Plurilateral; one party is a regional trade agreement	Oceania and South-East Asia
ASEAN – India	Goods	Free trade agreement	1 January 2010	Ten ASEAN countries and India	Bilateral; one party is a regional trade agreement	South-East Asia and South Asia

Source: APTIAD (2012).

thus clear that Lao PDR regulates automotive imports to the greatest degree, while Cambodia applies generally lower tariffs to open its automotive market.

In addition to trade and investment liberalization, improvements in transport infrastructure and logistics development have contributed to the expansion of the automotive value chains in the Mekong subregion. A number of cross-border road connections and their linkages to seaports and airports within the subregion have been upgraded, a necessity in helping facilitate the movement of automotive parts and components (Ksoll and Brimble, 2012). Further, the signing of the Cross-Border Transport Facilitation Agreement (CBTA) by the five countries of the Mekong subregion and China in 1999 was a major step in helping to improve cross-border logistics. This agreement aims to facilitate and simplify procedures required for cross-border cargo transportation, including regulations and measures such as single-window customs inspection, subregional road transport permits and “fast tracks” at border checkpoints (ADB, 2011).

Table 16.3 provides an overview of the automotive industry and market in the Mekong subregion. The recent value estimates of automotive trades in the Mekong subregion are over US\$ 19.1 billion in exports and US\$ 11.5 billion in imports. Thailand and Viet Nam are the first and second biggest trading countries for automotive products in the subregion. Production capacities, demand and motorization rates in the subregion can also be seen in Table 16.3. Thailand is by far the largest car market and vehicle producer in the subregion, while Viet Nam is the second-largest car market and producer, accounting for 8.2 per cent of total vehicle production in Thailand. It

TABLE 16.2: Tariff schedules for automobiles and auto parts in the Mekong subregion

			Cambodia	Lao PDR	Myanmar	Thailand	Viet Nam
Current tariff rates for personal cars in per cent (Engine capacity ≤ 2000 cc)	CBU	Within ASEAN	0–5	122	30	0	70
		Outside ASEAN	35	122	30	80	70–82
	CKD	Within ASEAN	0–5	122	30	0	0–30
		Outside ASEAN	35	122	30	30	65–78
Current tariff rates for auto parts in per cent	Within ASEAN		0–5	n.a.	n.a.	0	5
	Outside ASEAN		7–15	n.a.	n.a.	5–30	0–30

Source: Compiled from data in the 2012 Annual Report of the AMEICC Working Group on Automobile Industry.

Note: CBU stands for a completely-built unit, while CKD is a complete knock-down kit.

TABLE 16.3: Automotive industry in the Mekong subregion

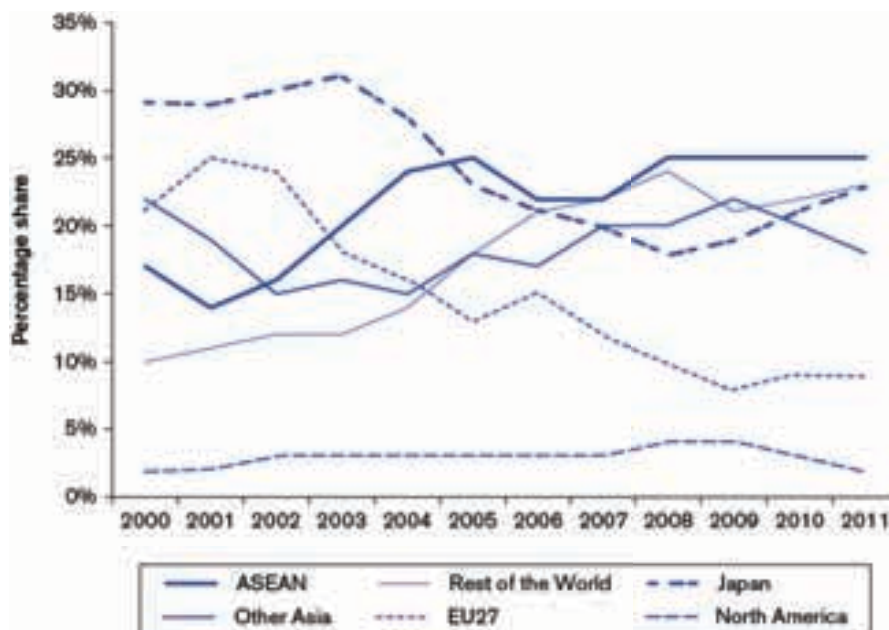
Country	Population (million, 2011) ¹	Population growth (per cent/year) ¹	GDP per capita (current US\$, 2011) ²	Annual average GDP growth (per cent, 2006–2011) ¹	Export value of road vehicles (million US\$, 2011, SITC Rev.2: 78) ³	Import value of road vehicles (million US\$, 2011, SITC Rev.2: 78) ³	Total production in units (2011) ⁴	Total vehicle sales in units (year) ⁴	Sales as a percentage of production	Motorization as units per 1,000 population (year) ⁵
Cambodia	14.3	1.2	854 (estimate)	8.2	298.1	416.8	6,300 ⁶	27,275 (2010)	433	18 (2005)
Lao PDR	6.3	1.3	1,320	9.6	7.6 ⁸	368.5 ⁸	0	85,000 (2011)	–	2 (2007)
Myanmar	48.3	0.8	824 (estimate)	5.5 ⁷	0.003 (2010)	156.8 (2010)	1,779	1,779 (2011)	100	5 (2009)
Thailand	69.5	0.5	5,395	3.6	18,043.4	8,317.9	1,457,795	794,081 (2011)	55	57 (2006)
Viet Nam	87.8	1.0	1,374 (estimate)	8.2	721.2 (2010)	2,288.9 (2010)	125,147	142,533 (2011)	114	13 (2007)

Sources: 1) World Bank (2012), *World Development Indicators*; 2) IMF *World Economic Outlook Database* (October 2012); 3) UN Comtrade (2012); 4) 2012 *Annual Report of the AMEICC Working Group on Automobile Industry* (AMEICC, 2012); 5) ESCAP (2012) *The Statistical Yearbook for Asia and the Pacific 2012*; 6) the author's interview with automakers in Cambodia; 7) estimate from the CIA (2012) *The World Factbook for 2009–2011*; and 8) International Trade Centre (2012), *Trade Map*, HS 4 Code 87 (vehicles other than railway, tramway).

is important to note that car sales exceeded car production in the countries in the subregion, except for Thailand, where approximately half the volume produced was exported in 2010, mainly to South-East Asia, South Asia, Japan, the Middle East and Oceania. Regarding Myanmar, it can be assumed that the number of vehicles sold also exceeds the number of vehicles produced, as the sales number for Myanmar does not reflect the import of second-hand cars, which is the major source of automobile supply. Generally, the observation of this sales-to-production ratio indicates that opportunities for expansion still exist to serve consumer demand in this subregion.

Automotive production and supply linkages in the Mekong subregion through global value chains have been reflected in the increasing South-South trade flows of automotive products, such as parts, components, complete knock-down kits (CKD) and automobiles, at both regional and global levels. Figure 16.2 illustrates various regions' share of automotive product flows with the Mekong subregion, using SITC Rev. 2 (78 for road vehicles). During the 2000s the importance of South-South trade in automobiles and intermediates has increased, while the importance of advanced

FIGURE 16.2: Share of automotive goods trade, Mekong subregion, 2000–11

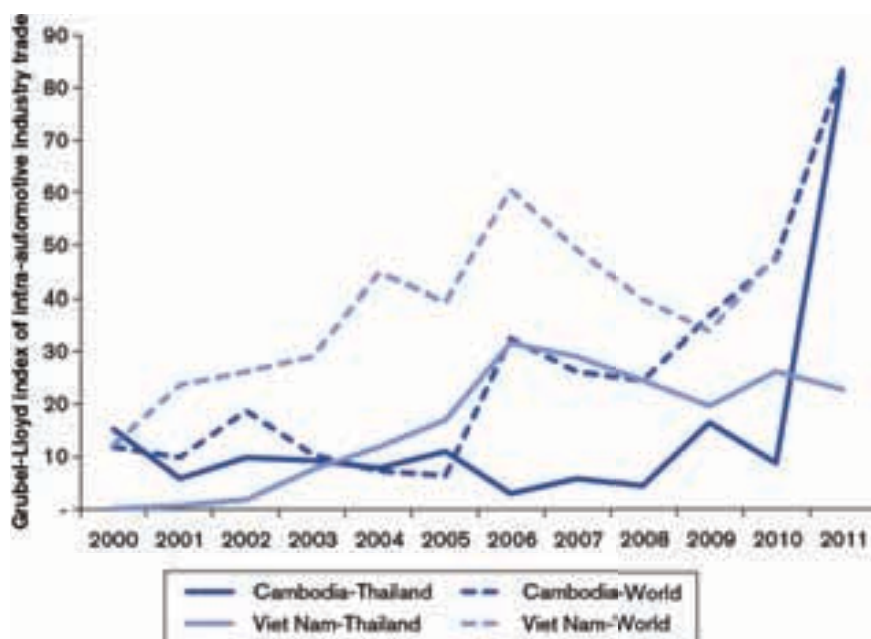


Source: Author's calculation using data from the United Nations Comtrade.

countries such as the European Union 27, Japan and North America declined or stagnated. In particular, the share of automotive product trades within South-East Asia and with the rest of the world have both increased.

Evidence of strengthened linkages within automotive value chains in the Mekong subregion is demonstrated by growing intra-industry trade, measured by the Grubel-Lloyd (GL) index (Srivastava and Kumar, 2012). Figure 16.3 shows the GL index for automotive products between three countries in the Mekong subregion, namely Cambodia, Thailand and Viet Nam. Intra-industry trade as compared to inter-industry trade has increasingly characterized the trade of automotive products within the

FIGURE 16.3: Growth in intra-automotive industry trade 2000–11



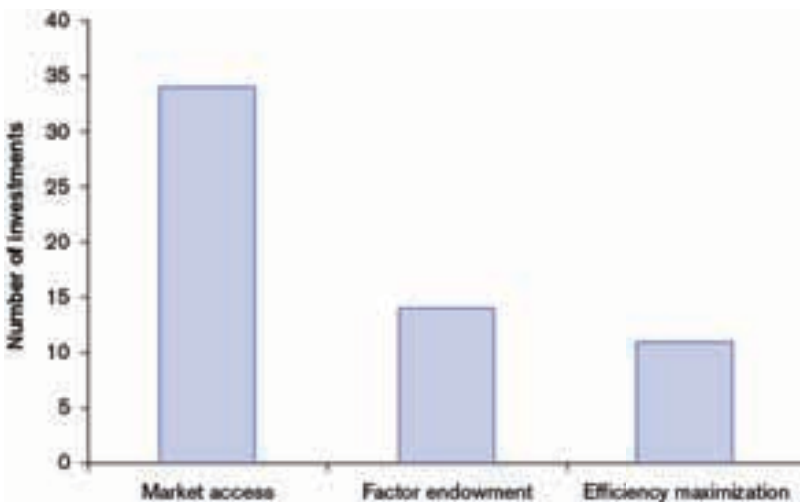
Source: ESCAP's calculation using the UN Comtrade database.

Notes: The degree of intra-automotive industry trade is measured by the Grubel-Lloyd index at the sectoral level (Grubel and Lloyd, 1975). Intra-industry trade is defined as the trade of goods between two countries within the same category of a standard industrial classification. The aggregated index is calculated as $GL_i = \left[1 - \frac{|X_i - M_i|}{X_i + M_i}\right] \cdot 100$, where GL_i is the Grubel-Lloyd index of intra-industry trade in product category i , and X_i and M_i denote total exports and imports of the product category, respectively. GL_i takes value between zero and 100. $GL_i = 0$ indicates that there is only inter-industry trade in the respective trade flows, while $GL_i = 100$ is interpreted as there is only intra-industry trade within the product category. The higher the index, the more the intra-sector trade between the countries. For this case, SITC (Rev.2) two-digit code (i.e., 78 for road vehicles) was used. Export-side data, a single series of trade values, were taken as the base data except that that Thailand's imports from Viet Nam were used due to the lack of Viet Nam export data in 2011. Total imports from the world were also taken as reported in the UN Comtrade.

subregion during the 2000s. This means that there has been growing trade within the automotive value chains across borders, in this case, between Cambodia and Thailand as well as Thailand and Viet Nam. In addition, the GL index has also risen at the world level, indicating increasing integration of the Cambodian and Vietnamese automotive industries within the global automotive value chains. The trend highlights that these value chains have been strengthening both within and beyond the subregion.

Figure 16.4 presents the major motives for FDI in the automotive industry in the Mekong subregion. The main reasons for the expansion of the global automotive value chains can be grouped under three broad corporate strategies: 1) market access; 2) access to factor endowment; and 3) efficiency maximization. Firms are motivated to enter new markets for their further growth (Czinkota and Ronkainen, 2007). It is also natural that firms seek to access low-cost labour, scarce materials and advanced technologies across the globe (Handfield, 1994). They also aim to reduce costs within the overall value chain for higher productivity (Christopher, 2011), often through offshoring.⁵ While automakers and their suppliers seek resources and cost reduction by entering the subregion, a majority of automotive investors have aimed to access the markets in the subregion through their direct investment. Figure 16.5 also shows the trend of strong FDI inflows to the automotive industry in the subregion.

FIGURE 16.4: Major motives of FDI for the automotive industry in the Mekong subregion



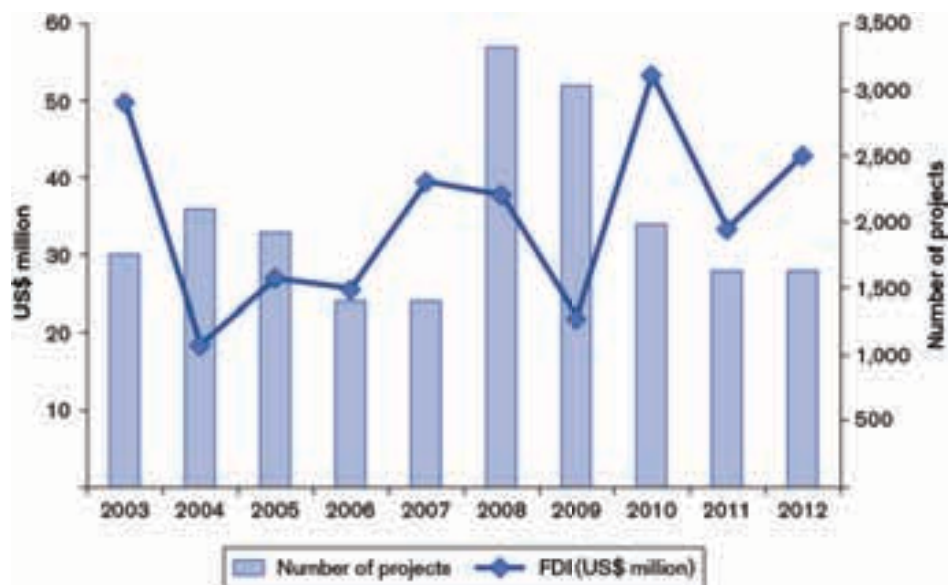
Source: Author's computations based on the data of Financial Times Ltd., fDi Intelligence (2013).

16.3. Characteristics of automotive value chains

The automotive value chain can be characterized as an automaker-driven network. This is because, common to many capital and technology intensive industries, automobile production systems are, to a great extent, controlled by the automakers (ESCAP, 2009). The automakers also own car brands whose value is maintained by massive investment in sales and marketing, after-sales services and quality assurance. The value chain consists of a complex mixture of firms of different sizes, types and geographic scope, producing an enormous variety of products from simple parts to technologically complex systems.⁶ Thus, the present automotive value chain has evolved into a complex, multi-tiered supplier structure with a high degree of outsourcing (Dicken, 2007). Automotive value chains specifically comprise the following players: standardizers, material suppliers, component specialists, integrators, assemblers and distributors (FPRI, 2012; Veloso and Kumar, 2002).

Standardizers, who are often automakers, conduct marketing research, develop the vehicle concept and design the specifications of the vehicle including its key modules

FIGURE 16.5: FDI inflows to the automotive industry in the Mekong subregion



Source: Author's computations based on data from Financial Times Ltd., fDi Intelligence (2013).

Note: No FDI project for Lao PDR is reported during the period.

and systems, heavily investing in research and development and process engineering. A first-tier supplier could be a standardizer by cooperating with the automakers in designing components and modules. Thailand has been the location of choice to date for standardizers, and R&D centres have been established by automakers in Thailand for the design of engines and localization of specifications. This is mainly due to the growing importance of the Thai market and Thailand's role as a regional production hub, where a localized R&D function is necessary to comply with local needs and trends, such as the green car policy, enacted in Thailand and other countries in the region. Standardizers have not as yet been established in other countries in the subregion.

Material suppliers provide various raw materials to automakers and their suppliers for parts and components production. Those materials include steels and metals, textiles, glasses, plastics, rubbers and chemicals. From the data currently available from the author's interviews with automakers and suppliers in the subregion, materials for automotive parts and components production are mainly sourced from Thailand (both Thai and foreign nationals) and supplemented by imports from other ASEAN countries, in particular Indonesia and Malaysia, and in some cases Australia, China, Europe, India, Japan, the Republic of Korea and North America. The automotive industry in the subregion still has to rely on imported materials from countries where advanced production technology and know-how are available.

Components specialists manufacture, according to the specification and requirement given by the standardizers, and deliver the required goods to integrators or assemblers for the purpose of module and system production or the final assembly of vehicles. The components specialists can be further categorized as either first-tier suppliers that deliver components directly to the assemblers and lower-tier suppliers that provide components to other suppliers or integrators. The lower-tier suppliers – most of them are smaller enterprises – tend to manufacture simpler and more labour-intensive parts that would later be incorporated by the higher tier suppliers (Veloso and Kumar, 2002). Thailand and Viet Nam are two primary locations for component specialists. Thailand has established its automotive parts sector with over 1,800 suppliers with growing involvement by local firms. Viet Nam has also established an automotive parts sector on a smaller scale with 200 suppliers, and it is more heavily reliant on imported parts than that of Thailand. Localization for Thai auto production now exceeds 90 per cent, while in Viet Nam it accounts for approximately ten per cent (Yamamoto, 2012). The presence of component specialists in other countries in the Mekong subregion apart is, at the moment, not yet widely established but some Japanese and other

first- and second-tier suppliers have recently expanded into Cambodia, Lao PDR and Myanmar (JETRO, 2012).

Integrators design and assemble key modules and systems for final assembly and are typically first-tier suppliers. Examples include integrating key elements into an engine and an air conditioning system. As the integrators must deal with a number of lower-tier suppliers, they must possess a high degree of supply chain management skill, while adequately investing in R&D and process engineering. Today, Thailand and Viet Nam are the primary locations for the integrators in the subregion. No integrator has yet to move to Cambodia, Lao PDR or Myanmar.

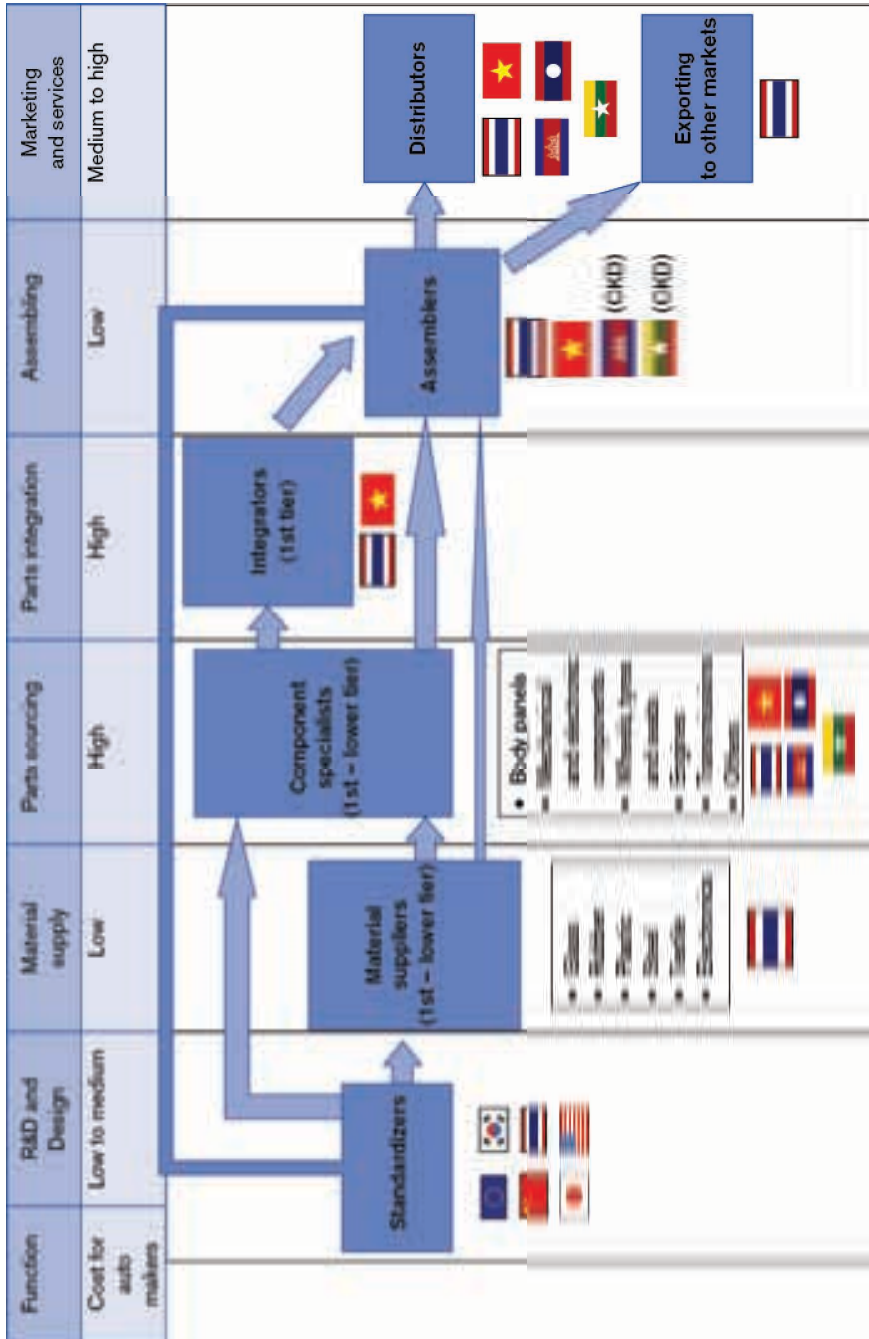
Assemblers, which are typically automakers (and for some exceptional cases first-tier suppliers), assemble vehicles in locations near their main markets or offer adequate access to factor endowment. Thailand is the leading location in terms of volume and variety of car assembly, including a large share for export. Since the 1990s, assemblers have also been also present in Viet Nam but on a much smaller scale, solely for the domestic market. Cambodia is now receiving increasing, if still modest, attention from assemblers, starting complete knock-down (CKD) assembly in the mid-2000s. Myanmar has recently developed auto assembly lines on a small scale and still imports used cars as a main source of automobile supply. Lao PDR has yet to attract any assembly line and is a net importer of vehicles.

Distributors supply vehicles to consumers in the local market, conducting various sales and marketing activities and providing after-sales services. As there is growing automobile demand in all countries in the subregion, a need for dealership and repair services has rapidly arisen. Dealership networks have been set up by major automakers in all countries except Myanmar where dealership development is underway.

Figure 16.6 illustrates the simplified relationships among the key players within the global automotive value chains. It also indicates specific national presence among the value chain players in the Mekong subregion.

Regarding the cost structure of the automotive value chain, the purchasing and production of parts, components and modules represent the largest cost area (see Figure 16.6), accounting for between 40 and 70 per cent of the price of an average car (ABN-AMRO, 2000; Holweg et al., 2009). The second and third largest cost areas are sales and marketing as well as research and development,⁷ accounting for roughly 20 per cent and nearly ten per cent of the car price, respectively. The costs for assembling and materials are both modest, each accounting for less than

FIGURE 16.6: A simplified global automotive value chain



Source: Author's computations.
 Note: Both inbound and outbound logistics costs are included in each function.

ten per cent of the car price (Holweg et al., 2009). Since supplies such as parts, components and modules account for the largest cost group, one key strategy adopted by the automakers to improve competitiveness has been effective supply chain management in order to reduce costs, and this has led to the expansion of automotive value chains to low-cost neighbouring countries.

16.4. Key findings from three industrial surveys

This section reviews the results of three most recent industrial surveys conducted in the Mekong subregion. The Japan External Trade Organization (JETRO) conducted the first and second surveys in 2009 and 2012, respectively. The third survey was conducted by the United Nations Economic and Social Commission for Asia and the Pacific (UNESCAP) and the Fiscal Policy Research Institute (FPRI) of Thailand in 2012. The first survey interviewed 103 Japanese investors and local enterprises mainly in manufacturing sectors, which operate in the Mekong subregion, to identify corporate strategies and challenges in their cross-border operations (JETRO, 2009). The second survey was conducted with 240 firms as the follow-up to the first survey and aimed to identify the major changes of corporate strategies and challenges from the 2009 survey, including the quality of infrastructure and related policies and regulations (JETRO, 2012). The third survey conducted by UNESCAP and FPRI looked into the specific strategies and challenges of the automotive industry in the subregion to complement the results of the JETRO surveys; thus, it was undertaken with 22 automotive-related agencies in the subregion, including automakers and automotive parts suppliers as well as automotive associations and institutes (FPRI, 2012). All three surveys adopted the semi-structured interview method but some informants participated in the surveys through telephone interviews and questionnaires.

The major findings from the three surveys are summarized as follows:

- The majority of surveyed firms have expanded or have a strong intention to expand their automotive value chains within the Mekong subregion, including less developed countries such as Cambodia, Lao PDR and Myanmar, for example, through investment in new factories and upgrading of existing facilities
- The motives for expansion of cross-border operations in the subregion are in line with the three major motives for automotive investment (see Figure 16.4): 1) to seek a greater access to market; 2) to secure key factor inputs such as labour; and 3) to reduce operational costs through pro-business policy framework in the host country

- The automotive industry has tried to reap benefits from various free trade agreements such as AFTA and ASEAN+6, sourcing parts and components from other ASEAN countries and ASEAN+6 partners. Different processes in automotive production can be shifted from one country to the other. For example, a firm in Thailand brings materials to Cambodia to be processed in a factory in the country and transports those processed products back to Thailand to finish the process
- Due to the implementation of the Cross-Border Transport Facilitation Agreement (CBTA), the movement of goods within the subregion has been significantly smoothed. For example, transshipment between Thailand and Lao PDR became unnecessary, resulting in the reduction of time and the risk of damage. Customs procedures were also improved significantly, officially introducing e-customs and fast-track systems

While their results strongly suggest major improvements in the cross-border business environment, the three industrial surveys also highlight a number of obstacles to the growth of automotive production linkages within the Mekong subregion. Those obstacles can be categorized into six groups: 1) trade liberalization; 2) trade facilitation and logistics; 3) infrastructure; 4) policy and regulatory framework; 5) labour market; and 6) business strategies. Those six groups are summarized in Table 16.4.

TABLE 16.4: Obstacles to the development of global automotive value chains in the Mekong subregion

Category	Details
Trade liberalization	<ul style="list-style-type: none"> • Different and stringent rules of origin across various free trade agreements (e.g., ASEAN-India FTA) • Different HS classifications among FTAs (even at the 6 digit level) and HS revisions • Difference in classification and understanding of the HS code among customs • Insufficient tariff reduction including those caused by "reciprocity" among FTAs (ATIGA and ASEAN-China) • Lack of information on ongoing FTA implementation and negotiations • Required specific documentations (certificates of origin)
Trade facilitation and logistics	<ul style="list-style-type: none"> • Insufficient simplification and harmonization in customs clearance systems • Time-consuming trade licensing • Original documents required at customs • Unofficial fees at customs • Higher import duties due to misclassification of the HS code and lacking transparent ruling systems

Category	Details
	<ul style="list-style-type: none"> • Low utilization of ICT based customs systems, particularly at the provincial level • High logistics costs of cross-border shipments • Lack of single-stop inspection at the borders • Inconvenient operation time of customs • Cumbersome procedures of certificate of origin (e.g., inspection in factories) • Insufficient deregulation of cross-border transportation (i.e., triple license) • Transshipment at borders (Myanmar border; Cambodia and Thailand border) due to non-ratification/implementation of CBTA • Increased number of permissions for cargo transportation • Lack of third-party international transport insurance • Inadequate customs and transshipment facilities • Inadequate linkage among logistical hubs (connecting routes, seaports and airports)
Infrastructure	<ul style="list-style-type: none"> • Poor road conditions and limited capacity and access • Instability and shortage of power supply • Insufficient water supply • Lack of railway networks (Bangkok-Phnom Penh-Ho Chi Min City railway) • Lack of adequate deep seaports and airports • Insufficient industrial estates, particularly in the border areas • Underdeveloped communication facilities (e.g., internet access and speed)
Policy and regulatory framework	<ul style="list-style-type: none"> • Unfavourable investment law and land acts for foreign direct investment • Stringent regulation and cumbersome procedures • Frequently changing legislation and lack of consultation with the private sector • Lack of transparent policy decisions • High registration fees and taxes (e.g., automotive sector in Viet Nam) • Inadequate protection of intellectual property rights (e.g., patents and trademarks) • Weak supporting industry and lack of policies for its development (i.e., poor SME cluster) • Underdeveloped legal system • High cost of foreign currency remittance
Labour markets	<ul style="list-style-type: none"> • Increasing labour costs (Thailand and Viet Nam) • Shortage of skilled labour (engineers and technicians) • Low labour productivity • Low quality of national education system, particularly lack of technical and engineering education (such as secondary vocational education)
Business strategies	<ul style="list-style-type: none"> • The necessity of proximity between automakers and suppliers for just-in-time delivery • Difficulty with punctual delivery by cross-border shipments • Lack of economies of scale • Lack of technology • Substantial financial outlays

Source: Author's computations based on JETRO (2009; 2012), FPRI (2012) and the author's interviews with the automotive sector.

16.5. Policy implications

A number of key findings were derived from the analyses as described in the previous sections. The automotive industry has increasingly moved to adopt a subregional production sharing strategy, that is, “the break-up of a production process into vertically separated stages carried out in two or more countries” (Athukorala and Menon, 2010). This strategy is to manufacture complex components and subassemblies in a central location (such as Thailand and Viet Nam); use lower tier parts suppliers from low cost countries in the subregion (e.g., Cambodia, Lao PDR and Myanmar); then distribute these components and subassemblies to the central location for integration; and ship those intermediate products to final assembly plants.

In this, the Mekong countries can enhance their cost-competitive position, while growing their domestic markets and increasing subregional linkages under the ongoing trade and investment liberalization in South-East Asia (i.e., ASEAN Economic Community and ASEAN+6). Strengthening cross-border automotive value chain linkages can enhance the participation of the Mekong subregion in this important industry and facilitate upgrading related to technology and skills. This, in turn, can strengthen the role of the subregion as a production base within an increasingly integrated regional economy. To apply this concept to the Mekong subregion, there are many opportunities to relocate the production of some parts and components – most likely labour intensive process – to the countries within the same geographical areas with the purpose of reducing costs as production of automobiles relies on many different activities.

In this context, a subregionally coordinated strategy of production relocation and integration could provide opportunities for neighbouring lower-cost countries such as Cambodia, Lao PDR and Myanmar to become lower-tier suppliers of selected labour-intensive components for the Thai automotive parts sector (and Vietnamese automotive parts sector to a lesser extent). Such cross-border production linkages could provide an entry point for such a country to the global automotive value chains, with significant developmental benefits.

In order to achieve the development potential derived from the global automotive value chains, collective actions may be seriously considered among key stakeholders, particularly in the areas of constraint summarized in the previous section: trade liberalization; trade facilitation and logistics; infrastructure; policy and regulatory framework; labour market; and business strategies. Table 16.5 combines

TABLE 16.5: Sharing responsibility to strengthen automotive value chains in the Mekong subregion

	Governments	Firms	Public-private partnership (PPP)	International cooperation
Trade liberalization	<ul style="list-style-type: none"> • Harmonization of various components of FTAs (preferential rules of origin, documentation and cost-analysis method) • Merging of existing FTAs • Further tariff reduction through multilateral and regional FTAs 	<ul style="list-style-type: none"> • Development of corporate strategies based on FTAs • More use of FTAs • Best production locations and value chain development based on FTAs • Collection and evaluation of FTA information • Communication with the public sector 	<ul style="list-style-type: none"> • Development of consultation process • Joint training and awareness building campaigns 	<ul style="list-style-type: none"> • Further trade liberalization • Harmonization of various bilateral and regional FTAs • Promotion of multilateral FTA (i.e., WTO framework)
Trade facilitation and logistics	<ul style="list-style-type: none"> • Improvement in logistic and customs systems • Full implementation of CBTA 	<ul style="list-style-type: none"> • Communication of business needs to the public sector 	<ul style="list-style-type: none"> • Joint development of third party transport insurance scheme • Joint task forces 	<ul style="list-style-type: none"> • Region wide assessment • Facilitation of subregional negotiation • Regional forums • Information sharing
Infrastructure	<ul style="list-style-type: none"> • Development of the master plan • Improvement of road connection and condition • Development of border industrial estates including special economic zones (SEZs) • Development of seaports and airports • Enhanced power and utility supply • Improvement of ICT facilities (high-speed internet access) 	<ul style="list-style-type: none"> • Communication of business needs to the public sector • Investment in infrastructure development 	<ul style="list-style-type: none"> • Appropriate "shared responsibility" GVC led infrastructure planning • Infrastructure development and associated investment • Risk information sharing. 	<ul style="list-style-type: none"> • Regional forums • Forum for transparent infrastructure development • Regional plan

(Continued)

TABLE 16.5: (Continued)

	Governments	Firms	Public-private partnership (PPP)	International cooperation
Policy and regulatory framework	<ul style="list-style-type: none"> Improvement of investment law and land act Support and incentives to facilitate investment to neighbouring countries Enhanced banks' role in the facilitation of investment Harmonization of policies as well as rules and regulations among governmental agencies Proper foreign exchange system and bilateral tax treaties Anti-corruption Material and supporting industries development 	<ul style="list-style-type: none"> Communication of business needs to the public sector Collective action among business associations Adherence to legislation 	<ul style="list-style-type: none"> Formal consultation process Joint assessment Joint task forces Information sharing and distribution Introduce PPP regulatory schemes on infrastructure development Joint institutional and capacity building for industrial development 	<ul style="list-style-type: none"> Region-wide information sharing Assessment and evaluation Harmonization of policy and regulatory framework Forum on cross-border division of labour
Labour markets	<ul style="list-style-type: none"> Reform in national education system Vocational /engineering training Initiatives to improve labour productivity 	<ul style="list-style-type: none"> Production in the low-labour-cost neighbouring countries On-the-job training Internship Collaboration with public training institutes 	<ul style="list-style-type: none"> Joint training schemes Joint internship schemes Joint institutes to provide skill development training Joint funds and resource pools for human resource development 	<ul style="list-style-type: none"> Regional forums Region-wide information sharing
Business strategies	<ul style="list-style-type: none"> Sharing and consulting development plan Provision of market information 	<ul style="list-style-type: none"> Careful supply network planning Relocation of labour intensive production to low-cost neighbouring countries Strengthened R&D functions Diversification of risks 	<ul style="list-style-type: none"> Joint task forces Information sharing National forums 	<ul style="list-style-type: none"> Targeted development aid Regional task forces Regional forums

Source: Author's computations.

specific policy suggestions for enhanced cross-border automotive value chains via strengthened sharing responsibility among governments, business and public-private partnership (PPP) and international organizations.

16.6. Conclusion

Trade liberalization, along with investment by automakers and increasing trade facilitation and logistics development, has been the cause of the recent transformation in the automotive industry in the Mekong subregion. The automakers have looked for opportunities for greater market and resources access as well as for cost reduction. As a result, less developed countries in the Mekong subregion are increasingly integrated into the global automotive value chains, and a number of suppliers, particularly those producing labour-intensive goods, are increasingly moving to Cambodia, Lao PDR and Myanmar. Integration into global automotive value chains, which typically comprise standardizers, material suppliers, components specialists, integrators, assemblers and distributors, has made it possible for the subregion to establish strong manufacturing bases and benefit from increased exports and further FDI inflows. Diversified and growing division of labour also is being developed among the countries in the subregion.

However, a number of constraints still exist preventing full achievement of the growth potential of cross-border automotive production linkages within the subregion. Collective actions among governments, business and international agencies are required in various fields, including: trade liberalization; trade facilitation and logistics; infrastructure; policy and regulatory framework; labour market; and business strategies.

For further research, two approaches are recommended. First, more reliable trade and investment data must be collected directly from the countries in the Mekong subregion. With growing membership among the countries of the subregion to the WTO (most recently, Lao PDR's accession in 2012), it is expected that more reliable and comprehensive trade statistics will become more available in the subregion. Second, a small number of representative automotive value chains should be selected for detailed mapping, in close consultation with governments and automotive industry in the Mekong subregion. Diagnosing specific bottlenecks that constrain growth and efficiency in the selected automotive value chains will then provide the basis for recommendations with more general implications for the automotive industry in the subregion.

Endnotes

- 1 This subregion is also part of the Association of Southeast Asian Nations (ASEAN). It is often called mainland ASEAN, while Brunei Darussalam, Indonesia, Malaysia, the Philippines and Singapore are called maritime ASEAN.
- 2 ESCAP's calculation based on data from the UN Comtrade (SITC Rev.2: 78).
- 3 ASEAN countries have agreed to establish the AEC by the end of 2015. For more details visit <http://www.aseansec.org/>.
- 4 For details see Legewie (1999) and Hiratsuka (2010).
- 5 Offshoring refers to activities that utilize facilities located in a country other than where the enterprise is based (Vitasek, 2006). The motivation for offshoring has primarily been cost reductions, economies of scale and possibly lower financial costs such as borrowing costs and tax rates (Aron and Singh, 2005).
- 6 For example, over 4,000 parts and components are used for the 2012 model of the Toyota Camry sedan car (the author's interview with the automotive industry in Bangkok, November 2012).
- 7 It is understood that the cost of research and development varies widely among standardizers and automakers.

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Global value chains in a changing world

Global value chains (GVC) are a major driving force of globalisation. They are an inevitable outgrowth of the application of transformative information and transport technologies, combined with new business models and largely open borders. The GVC phenomenon promotes integration on multiple levels. Today's international production systems confound traditional ways of looking at investment, production, finance, information systems and technology. These can no longer be seen as separate, meriting distinct attention and discrete policy treatment. The international fragmentation of production has generated the opposite of fragmentation – a complex networked system of production and consumption with innumerable moving, interactive parts.

Efforts to understand the dimensions of GVCs have spread across disciplines. This volume is the product of a dialogue with policy makers in the Asian region, where economists, political scientists, management specialists, development thinkers and business executives joined together in an exploration of the multiple dimensions of supply chains, what drives them, how they operate, how they adapt in a rapidly changing world, and what they mean for development and for policy.

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