



Global Factories: Concepts, Structures and Consequences

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ABSTRACT

Using the concepts of global supply/value/production chains, the meaning of global factories is established in Section 1. Section 2 distinguishes between producer driven and buyer driven supply chains. How the specific structures of global factories have come into existence in the electronics, automotive and apparel industries in the Asian countries is described and explained in Sections 3, 4 and 5. Section 6 deals with the adverse consequences of these global factories in Asia. In light of this, a difficult agenda for research is proposed in the last section.

1. Introduction

Global Supply/Value/Production Chains

Corporate-led globalisation has opened immense opportunities for transnational corporations (TNCs) to accumulate profits generated in developing countries by force opening a new international division of labour and all-round privatization and liberalization of the economies. And with this, the concepts of global production chains, global value chains and global supply chains have emerged as new strategies for profit maximization on the part of the global factories, i.e. factories that cross international borders (Pratap, 2014).

Chang et al. (2012) give us a good lead in conceptualising these global factories by way of supply chains/value chains/production chains. The global supply chains (GSC) of industries or companies are systems of resources, organizations, people, technology, information and activities spread across the globe and involved in the production and trade of goods and services. In other words, a GSC is a worldwide network of suppliers of raw materials and other inputs, manufacturers

(including component or other input manufacturers, assembly plants or final product manufacturers), warehouses, distribution centres and retailers, through which raw materials are acquired, transformed into the final product and delivered to the consumers. The supply chains of industries and companies have always existed in some form, but they were generally restricted to national boundaries and within particular regions of a country. The change that has taken place in the current phase of globalisation is that now the supply chains are dispersed all over the globe.

The global value chains (GVC) of industries and companies are those parts of the global supply chains where value adding activities take place, including extraction and sourcing of raw materials, research, technological development and designing, manufacturing of intermediate inputs, and the manufacturing of final products and services. Therefore, the value chain can be seen as basically an analytical tool for studying the degree of value added by various activities involved in bringing out the final product and therefore also the degree of value added at different geographical locations. Strictly speaking, in a Marxian sense, no real value is added in marketing, distribution and advertising activities. However, these represent costs to the companies and therefore, many economists include them in their value chain analysis.

The global production chains (GPC) are product-specific global value chains of companies or industries. They show how lead firms, such as Honda, Samsung or Adidas, arrange their network of suppliers to produce a particular type of car, mobile phone or sports shoe. In these arrangements, the lead firms generally control the key resources

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and activities, such as the technology and design, the brands and the customer network. Therefore, they are able to exercise effective control on their suppliers.

The high degree of international subcontracting underlying the expansion of global supply/value chains has become possible as a result of declining shipping and communication costs. Parts and pieces are moved, not merely among countries, but also within corporate production networks, where transfer pricing reduces or eliminates certain types of costs, such as taxes on the full value of the product. The whole picture of this international division of labour sometimes looks as if the capital of developing countries is reduced to the status of managers of transnational capital. Moreover, these managers are highly obedient out of fear that transnational capital may fly away any time on getting opportunities for more profitable investments elsewhere.

If we look at the global picture in 1990, the foreign affiliates of the top hundred nonfinancial multinationals of the world accounted for only about one third of their total assets and less than half of the sales and employment. However, by 2008 they accounted for about 60 per cent of their total assets, employment and a far greater share of total sales. For example, the share of foreign assets, sales, and employment of General Electric's foreign affiliates rose from 36 per cent, 38 per cent, and 46 per cent, respectively in the year 2000, to 50 per cent, 53 per cent, and 53 per cent in 2008. For Ford Motors, its foreign affiliates' total assets, sale and employment increased from 7 per cent, 30 per cent and 53 per cent in 2000 of the corporate totals to 46 per cent, 59 per cent and 58 per cent respectively in 2008. A full 86 per cent of Coca-Cola's total workforce in 2008 was employed by its foreign affiliates. In the two decades preceding 2008, the share of value added by the U.S. based parent companies had fallen by about 10 percentage points. In overall terms, at least 40 per cent of world trade is linked to outsourcing. In some cases like Nike, all production is outsourced to subcontractors in Asia. In 1996, a single Nike shoe contained 52 different components produced by subcontractors in five different countries. Monopolistic multinational corporations, such as Nike and Apple, earn extremely high profit margins by exerting strategic control over their supply lines—regardless of their relative lack of actual FDI. How much surplus is accumulated by TNCs from developing countries can be seen in the fact that in the late 1990s the entire labour cost for the production of a pair of basketball shoes, retailing in the U.S. for \$149.50, was only about \$1.50 if produced entirely in Vietnam, or about 1 per cent of the final retail price (Foster et al., 2011).

The global supply/value chains of TNCs are increasingly assimilating and linking all economic activities. The value chains of the factories can extend to the home-based worker. Peasants and most other categories of self-employed workers are also increasingly transformed into wage labourers in their own fields and assimilated into the global supply/value chains by such strategies as promoting contract farming for TNCs. Therefore, the most dramatic change that has happened in the current phase of globalisation is that the fate of almost all workers and producers is now controlled by the transnational corporations.

2. Producer Driven and Buyer Driven Supply Chains

It is useful to look at the global factories by distinguishing them between producer- and buyer-driven supply chains. The producer-driven supply chains reflect the primary type of global supply/value chains which have given birth to global factories wherein TNCs still function as the lead firms and handle the final operations (final assembly) to produce the final products. However, almost all inputs

are manufactured and supplied by a globally distributed network of suppliers. Suppliers are linked with the lead firms as if they are an extension of the lead firms, supplying input goods in a timely manner. This arrangement, along with providing opportunities to exploit cheap labour in developing countries, benefits the TNCs in other ways. For example, the cost of the infrastructure and the management of human resources needed to produce the inputs, the cost of rejections (of poor quality parts and components) and the cost of maintaining inventory is transferred to the suppliers. This type of supply chain is the characteristic feature of capital and technology intensive industries, such as the automotive, ICT and semiconductor industries.

Sometimes we also witness multi-polar value chains, wherein there is no overall dominant lead firm with the power to determine the ultimate shape of final products, rather there is more than one major firm exercising control over certain key activities throughout the chain. For example, Intel, Microsoft and Fujitsu are lead firms in their own production chains within the global value chain of personal computer production. A personal computer marketed by Fujitsu reflects Microsoft's software strategy, Intel's strategy in semiconductors, and Fujitsu's customer-based brand reputation and marketing strategy (Chang et al., 2012).

The buyer-driven supply chains reflect the advanced form of the global supply chain, wherein the TNCs as lead firms based in developed countries are largely transformed into hollow corporations with no direct engagement in manufacturing operations at any level. For example, all the major brands in the garment industry operate by sourcing from decentralised global networks of independent suppliers. These firms exercise effective control over the suppliers through control of R&D, by making them completely dependent on the orders provided by the major brands and retailers, and by effective control of the world market. Designs, product-process specifications and standards are dictated by the brand holders.

With such effective control on suppliers, the TNCs are able to put consistent pressure on them to lower costs, while compelling them to bear all operational costs and risks. The buyer-driven supply chains are a characteristic feature of labour-intensive industries in the apparel, footwear, agro-industry and consumer electronics. In these in buyer-driven supply chains, no direct investment is provided by the TNCs to the local industry. It becomes a simple case of the accumulation of the surplus generated in developing countries by power of finance and control on the markets. It is true that significant employment is generated in developing countries by the expansion of buyer-driven supply chains. However, the majority of these jobs are highly precarious in nature, and moreover there are serious fluctuations in demand for labour. The quality of employment in these chains has, thus, come under heavy fire (see, for example, Boyd, 2006; Schmidt, 2005; Chang, 2009).

We now proceed to discuss how these global factories have come into existence in electronics, automobile and apparel industries.

3. Electronics Global Value Chain

In the late 1980s and early 1990s, most North American electronics firms in the computer and networking sectors, such as Apple, IBM, Nortel, 3Com, Hewlett Packard, Maxtor and Lucent, sold much of their domestic and offshore production facilities to large contract manufacturers (CMs) and rapidly moved toward outsourcing their circuit-board and product assembly. New companies, such as Sun Microsystems, Silicon Graphics, EMC, Juniper Networks, Sycamore Networks, Cisco Systems and Network Appliance, outsourced most of their production from the outset. In late 1990s, most of the major European electronics firms, such as Ericsson, Philips, Siemens, Nokia

and Alcatel, also followed the same path. They were joined by Japanese electronics firms such as NEC, Fujitsu and Sony soon after. It is interesting to note that most of the top contract manufacturers that acquired the facilities of global brands were mainly based in the same countries or the regions where the brands were located. For example, all the top five contract manufacturers in North America i.e., Solectron, Flextronics International, Sanmina/SCI, Celestica, and Jabil Circuit were based in the U.S. or Canada (Sturgeon, 2002).

With ever-increasing shift of production operations to developing countries, the global brands in electronics also demanded that their contract manufacturers have a global presence and capabilities to provide global manufacturing and process engineering support. Contract manufacturers aggressively seized this opportunity through acquisitions and capacity expansion. Within a few years, they developed their own global production networks, complementing the networks of the global brands. For example, Flextronics built its network over 62 plants worldwide, Solectron set up factories in 70 countries, and Sanmina/SCI has 100 factories around the world (Ernst, 2004).

With the boom in outsourcing of electronics manufacturing in East and Southeast Asia, including China, the electronics firms in the newly industrialised countries of Taiwan, South Korea and Singapore quickly moved up the value chain to the level of original equipment manufacturers (OEMs) and original design manufacturers (ODMs). The Taiwanese firms were largely compelled to remain at the level of contract manufacturers and they specialised in that position and enhanced their technological capabilities to move up from the level of OEMs to the level of ODMs. By contrast, many Korean firms were able to emerge as powerful global brands—own brand manufacturers (OBMs)—such as Samsung and LG. The Singapore firms remained specialised at the OEM levels. These OEM, ODM and OBM firms from the newly industrialised Asian countries have also expanded globally, particularly in Asia.

The rate of global expansion of the top contract manufacturers and the growth in their revenue has been tremendous. The world's top five electronics contract manufacturers grew their revenue at an annual rate of 45 per cent a year between 1995 and 2002, and 67 per cent of their revenue in 2002 was generated from acquisitions of manufacturing facilities of lead firms and other local firms worldwide in previous three years (Sturgeon, 2002). It is interesting to note that four of the world's top five contract manufacturers by revenue are from Taiwan in 2009. This reflects the emergence of China as the world's electronics factory and the dominant role played by the Taiwanese contract manufacturers in China (Sturgeon and Kawakami, 2010).

With heavy use of computers and information technology in all walks of life and in all other industrial sectors, the electronics hardware industry has emerged as the world's most important manufacturing sector, and with the global value chains emerging as the most dominant form of electronics manufacturing, the level of trade in electronics, particularly electronics intermediates, reflects the level of manufacturing growth in particular countries. Intermediate electronics, along with automotive goods, accounted for nearly 65 per cent of the world trade in the top 50 manufactured intermediate products in 2006. From 1998 to 2006, the share of electronics intermediates alone (including semiconductors, printed circuit boards and others) increased from 24.4 per cent to 43.3 per cent of the world trade in the top 50 products. The share of automotive intermediates fell from the top spot in 1988 (25.1 per cent) to the number two spot in 2006 (21.4 per cent). The growth rate of trade in electronics intermediates was 13.8 per cent per year during this period, the highest in the top 50 product groupings (Sturgeon and Kawakami, 2010).

It is interesting to note that in both the intermediate goods exports and intermediate goods imports, the same countries are prominent, and Greater China (China, Hong Kong and Taiwan) accounts for as much as 33.1 per cent of world imports and 29.4 per cent of world exports of intermediate electronics goods. This reflects the following characteristics of the electronics industry (Sturgeon and Kawakami, 2010):

- a. In the global value chain of electronics, manufacturing operations located in various countries are interlinked; in all the locations crucial component inputs are imported to produce the required intermediate products that are in turn exported to other locations as inputs.
- b. World electronics manufacturing is highly concentrated in China with Taiwanese firms playing a major role in comparatively high value adding activities. Hong Kong perhaps gets prominence because most of imports and exports from China are routed through it.
- c. Major high value components are still produced in high-tech facilities of the lead firms based in the U.S., Europe and Japan and exported to East and South East Asian countries, particularly China.
- d. Major players in electronics manufacturing in the developing countries of East and Southeast Asia (other than Japan and the newly industrialised countries) are China, Malaysia, Thailand and the Philippines. Recently, Indonesia and particularly Vietnam have also gained importance in the global electronics value chain.

With the exception of India, South Asia is still not well integrated in the global electronics value chains. India's output in electronics hardware industry is only about US\$20 billion (2008-09), which is about 1.31 per cent of the global output. The electronics industry's share of India's GDP is only about two per cent. However, India has emerged as a prominent market for electronics goods. It is currently worth about US\$45 billion (2008-09) and is expected to reach US\$400 billion by 2020 (Pratap, 2013).

China clearly takes the top spot as the world's largest producer and exporter, and also as one of the largest consumers of electronics. For example, China is not only the largest producer and exporter of mobile phone handsets, but also the largest consumer. The growth is amazing. In 1998, its share of world mobile handset production was just 2 per cent; by 2005, production had jumped to account for more than 37 per cent of world production. During the same period the share of handsets produced for export increased from 55 per cent to more than 75 per cent, and the number of mobile phone subscribers in China also soared from about 25 million to about 400 million (Sturgeon and Kawakami, 2010).

China's rise is clearly a positive factor in accelerating the growth of electronics manufacturing in East and Southeast Asia in general, due to the very nature of global value chains, wherein profit maximization takes place by increasingly shifting labour intensive operations to various locations to reap the benefits of various cost advantages and capabilities, while not allowing any increase in the bargaining power of labour or enterprises involved in the value chain at any location.

The electronics global value chain is increasingly becoming a buyer driven value chain, but the producer driven chain also exists as some brands still do final assembly in their own assembly plants. However, by and large the following structure of the global electronics value chain has been created in Asia:

1. **OBMs (own brand manufacturers)/lead firms:** The most important lead firms are based in developed countries, mainly in the U.S., Western Europe and Japan. Among the newly industrialised countries only Korea stands out as a base of important lead firms, especially Samsung and LG. A handful of some other lead firms have emerged, particularly in Taiwan and China; these include, Acer, a personal computer (PC) maker of Taiwan, Huawei, a Chinese manufacturer of networking equipment and Lenovo, a Chinese PC company that emerged as a global brand after acquisition of IBM's PC division in 2004 (Sturgeon and Kawakami, 2010).
2. **Platform Leaders:** The companies owning crucial technologies (software, hardware, or a combination of the two,) used in products of many other companies. They are all mainly developed countries firms with only few exceptions like MediaTek--a "fabless" semiconductor design house from Taiwan.
3. **CMs (contract manufacturers):**
 - i. **ODMs (Original Design Manufacturers):** Taiwanese firms have a clear dominance among ODMs in Asia
 - ii. **OEMs (Original Equipment Manufacturers):** The firms from Taiwan, Singapore, South Korea and China are the major players as OEMs in electronics industry in Asia;
4. **Tier I suppliers:** Locally based in developing countries as well as developed countries and the newly industrialised countries;
5. **Tier II and III suppliers:** Locally based in developing countries.

In this way we can see that firms in the developing Asian countries are typically locked at low value adding positions of the global electronics value chains. Even among the first-tier contractors, the companies from developed countries or the newly industrialised countries dominate, and the local companies are mainly located in the second or third tier of the value chain. For example, in the Philippines, out of total 715 electronics firms, only 28 per cent are local and more than 80 per cent of total electronics exports from the Philippines are produced by subsidiaries or affiliates of MNCs (EILER, 2007).

More complex, capital-intensive precision components, i.e., memory devices and displays, are sourced mainly from Japan, South Korea, Singapore and Taiwan, and hard disk drives are sourced from a Singapore-centred triangle of locations in Southeast Asia. High-precision, design-intensive components, such as microprocessors, are sourced from platform leaders like Intel, which are mainly based in the developed countries (Ernst, 2004).

Malaysia needs special mention here. The proximity and linkage with Singapore's electronics industry and the market helped early emergence of Malaysia as a major electronics manufacturing centre. The share of electronics and electrical products in Malaysia's gross exports of manufactured goods was as high as 72.5 per cent in 2000 (Yunus et al., 2012). With rise of China as a production hub, its electronics industry recorded a decline; however, with determined focus on acquiring technological competence and moving up the value chain, Malaysian firms remained as major players in ICT. For example, Malaysia has a very strong position in the photovoltaic (PV) industry, and its medical devices industry (MDI) is another globally competitive industry (World Bank, 2011). Malaysia has been focusing all its efforts on basic research and brand commercialization to further

move up the value chain to survive in the new competitive environment.

Similar strategies and processes of moving up the value chain can also be observed in China, where many Chinese firms are increasingly moving to the middle levels of the value chain, and some, such as Lenovo, are emerging as globally competitive brands. However, in general the country remains placed at the low value adding positions of the value chain. In India, this trend is particularly dominant in ICT services rather than in electronics manufacturing. The emergence of Tata Consultancy Services as a multinational company, operating in 46 countries and having 199 branches across the world, can be cited as the most important example. In electronics manufacturing there are a few national brands in India but with very small share in national market and almost no international presence.

It is interesting to note that the major share of value in electronics manufacturing is created by the lead firms and in some cases by platform leaders, and so the major share of revenues also goes to them. For example, it is estimated that only \$4 of the \$299 retail price of an Apple 30 gigabyte video iPod MP3 player is captured in China, where they are assembled and tested by Inventec, a Taiwan-based ODM contract manufacturer. The share captured by domestic Chinese companies is very low and probably limited to packaging and local services. As for the iPad tablet computer, Apple's gross margin is estimated to be at \$270, or 54 per cent of the \$499 sale price. Very little of the product's value is captured in China and even less by mainland Chinese companies (Sturgeon and Kawakami, 2010).

How does this happen? The crucial components for assembling iPods are manufactured mostly in the U.S., Japan, and Korea, and not in China. Most importantly, iPod's high-level design work and software development is conducted in-house by Apple. In this way, the major share of revenue is captured by Apple, its technology suppliers and retailers.

In some product sectors the platform leaders capture the major share of revenue. For example, in the notebook PC value chain more than 50 per cent of the profit is captured by Intel, the platform leader that supplies most of the central processing chipsets to the notebook PC industry. The profit share of lead firm Dell is about 20 per cent, and for Taiwan-based contract manufacturer Quanta 5 per cent. The revenue earned by suppliers of components for these products based in East and Southeast Asian countries must be much lower (Sturgeon and Kawakami, 2010).

However, these high margins for platform leaders are limited only to some product sectors; in other product sectors the lead firms capture the major share of revenue. Needless to say again, most contract manufacturers have also been trapped in low value-added segments of the electronics global value chains.

6. Automobile Global Value Chain

The automotive industry, like the electronics industry, is one of the important engines of growth for other industries, such as mining, metal, plastics, electronics, and construction. From the outset, the automobile manufacturing was located close to the markets, all the automobile brands were from the developed countries particularly from North America, Europe and Japan, and the automobile market was also concentrated in these regions. With the advent of mass production lowering the cost of automobiles and making them mass commodities, particularly during the period between the two world wars, the expansion of automobile industry started in other regions as well and some final assembly plants were established in the regions with promising markets to reduce transport costs. Trade barriers also

forced the automobile companies to establish assembly plants in a country to participate in its market. Particularly after World War II, when trade barriers were extended to components also, then global automobile brands were forced to integrate offshore production and source the components locally to the extent possible. With these developments, a regional pattern started emerging with the North American and European automobile brands expanding more into America Latina, and Japanese brands into other parts of Asia.

In the 1980s, a new dynamics emerged. On the one hand, the automobile industry encountered a serious profitability crisis, and on the other, the automobile market, which was mainly concentrated in North America and Europe, came to a certain level of saturation, and so intense competition started among the global automobile brands. This was reflected in a growing concern in America and Europe about the flooding of their local markets with automobiles imported from Japan. The Japanese automakers were compelled to set limits on their market share via exports. In response the Japanese automakers established large number automobile plants in the U.S. and Europe to locally manufacture a significant share of passenger vehicles to be sold in the U.S. and Europe. However, it did not resolve the real problem of saturation of markets and the falling rate of profits and therefore the competition among the global brands was further intensified. This competition reduced the number of global players with a major share of the market to four, viz. Toyota, Volkswagen, Ford, and Hyundai.

It was in this business environment that the global automobile brands began adopting two strategies: (a) Shifting manufacturing operations to low cost locations, and (b) expansion into other regions with prospects of emerging future promising markets. In the 1980s, the American and European automobile brands increasingly expanded their manufacturing operations in low cost peripheries, such as Canada, Eastern Europe, Mexico and Spain, along with increasing automobile sales in these regions. In addition, they imported an increasing share of automobiles manufactured in these low cost locations into their home markets. Regional trade agreements, such as the European Union (EU) common market and North American Free Trade Agreement (NAFTA), facilitated and accelerated such developments.

Some sort of global value chain started emerging with the above developments. However, in real terms it took shape only after the 1990s when most of the developing economies were increasingly liberalised, and the global brands in various industries started aggressively expanding their operations in developing countries. Soon Asia emerged as one of the most important hubs of the global factory. The historic shift of automobile manufacturing from developed to developing countries was tremendously accelerated by the 2008–09 economic crisis, and therefore the real picture of this shift is actually still taking shape: The liquidation of small producers, plant closures and capacity reduction in many firms in developed countries has yet to be completed (Biesebroeck and Sturgeon, 2010).

The data on automobile manufacturing growth from 2002–07 for countries producing more than one million vehicles very clearly reflects this historic shift (Biesebroeck and Sturgeon 2010). During this period nearly all the North American countries in this category recorded negative annual growth, and Japan recorded growth of only 2.48 per cent. On the other hand, three Asian countries, China, India and Thailand, recorded annual growth rates of 22.29, 18.06, and 16.88 per cent, respectively.

This historic shift was fuelled to increase profitability by reducing the cost of production and to capture a larger share of emerging markets. Japan, the U. S. and Western Europe are still the major

markets for automobiles, but average demand is growing at a rate of less than 1 per cent a year. On the other hand, East Asian automobile markets have been recording annual growth rates of about 15 per cent. It is projected that soon the Asia-Pacific region, excluding Australia and Japan, may account for 45 per cent of incremental volume, and China and Korea together may reach the level of Japanese volumes (Doner et al., 2004). Some projections even claim that 50 million cars (about 3.5 times the size of U.S. market) would be sold annually in China by 2050 (Sturgeon and Lester, 2004).

With the dramatic expansion of manufacturing facilities of the global automobile brands, an industrial restructuring, similar to that seen in the electronics industry, also took place in automobiles.

In-house component manufacturing was considered a drain of resources, and it was actually not possible for brands to manage such large scale in-house operations in component manufacturing across the globe. Therefore, all the global brands adopted a strategy of outsourcing all the component manufacturing to competent suppliers. On the other hand, the brands specialised in high tech R&D, innovation and design to reap a higher share of revenues from the value chain and also to exercise effective control on the global value chain. To streamline their global operations the global automobile brands demanded their suppliers to have a global presence and system design capabilities. Like the transnational contract manufacturers that emerged in the electronics industry, huge transnational component suppliers with a global presence emerged in automobile industry. Also, these transnational component suppliers were mainly based in North America, Europe and Japan, and mergers and acquisitions played an important role in their global expansion and growth. For example, the world's two largest component suppliers emerged from Ford's and General Motors' former component divisions (Sturgeon and Lester, 2004). Major suppliers produced components for multiple automobile brands, and some of them grew to be larger than any one automobile brand. These suppliers include PPG, Bosch, Johnson Controls, Lear, Magna, Siemens Automotive, TRW, Yazaki, etc.

The automobile value chain has some structural differences from that of electronics value chain. The value chain of the automobile industry is more organised nationally or regionally, to reduce the transport costs and also due to political pressures. The main assembly plants are located in the nations with the larger market share. Production of bulky, heavy, and model-specific parts is concentrated close to final assembly plants. Only lighter and more generic parts are produced in other countries/regions to take advantage of economies of scale and low labour costs. Owing to the specific nature of automobile products and manufacturing, there is no system of contract manufacturers; the main assembling is still done in the assembly plants of the global brands and the brands themselves play the role of OEMs/ODMs. There are also a number of brand OEMs producing crucial equipment used by various automobile companies.

The automobile global value chain is a producer-driven chain and has by and large the following structure:

- a. Global Automobile Brands/OEMs carry out the main assembly operations in their own assembly plants located all over the globe, but the actual work in these assembly plants is reduced to only bolting and fixing various fully developed modules or systems.
- b. Tier I suppliers design and assemble the modules or systems by sourcing components from lower tier suppliers. For example, first-tier suppliers deliver fully assembled vehicle doors (with the glass, fabric, interior panels, handles and mirrors preassembled), and assembled dashboards with

polymers, wood, displays, lights, and switches all mounted. About 75 per cent of the vehicle value is accounted by only 15 modules (Sturgeon and Lester, 2004). One section of Tier I suppliers is moving up the value chain to specialise in designing modules.

- c. Tier II suppliers assemble the components by sourcing the parts supplied by lower tier suppliers.
- d. Tier III suppliers manufacture parts and supply them to component and module assemblers.

With the above dynamics, the global value chains of the automobile industry have expanded into almost all the regions of the world, and this is well reflected in the high share of automotive intermediate goods in global trade. Of the top-50 manufactured intermediate products in world trade, the share of automotive intermediates stands at 21.4 per cent, second only to electronics (Sturgeon and Kawakami, 2010).

Asia has been emerging as a major centre of the global automobile value chain. Of the top 10 exporters of intermediate automobile parts from developing economies, six are Asian countries. Moreover, aggregate growth rates (CAGR) from 1988 to 2006 clearly show that Asia has already replaced Latin America and pushed it to the second position. China clearly emerges as the world's major centre of automobile manufacturing. Of the other Asian countries, Thailand, Taiwan, Indonesia, the Philippines, and India emerge as the most prominent centres of the global automobile value chain. China is also the biggest market in Asia, followed by Korea, Taiwan, Malaysia, Indonesia, Thailand, and the Philippines. In Southeast Asia, Malaysia is the biggest market, and in South Asia India is the single biggest market. Vietnam is another major production centre and an emerging market for automobiles (Biesebroeck and Sturgeon, 2010).

The automobile GVC expanded in India comparatively early unlike the electronics one. By virtue of its large and growing markets and special nature of automobile global value chain (requiring main assembly plants to be located in the vicinity of markets and major supply chains located in the vicinity of assembly plants and thereby neutralizing the drawbacks of lack of regional value chain networks), India has emerged as one of the important automobile production hubs.

Thailand also needs a special mention here. A promising home market and an advantageous geo-political location along with opportunities created by formation of ASEAN have helped Thailand to emerge as a major production platform for major international automobile players. Due to its advantageous geo-political location, vehicles are manufactured in Thailand to serve regional markets along with national market. One-tonne pick-up trucks manufactured in Thailand are sold world-wide (Kohpaiboon and Yamashita, 2011).

It comes out very clearly that along with other factors the size of the market plays most important role in determining the expansion of the automobile global value chain in a particular country or region. This factor has also provided the opportunity for some companies, particularly in countries with larger markets, to emerge as stronger automobile brands particularly in their home markets, and therefore to gradually emerge as global brands. Examples are the ascendance of Chinese companies, such as Chery and Geely (after the takeover of Ford's Swedish car unit, Volvo) and India's Tata (after the takeover of Ford's Jaguar and Land Rover units in England) to the ranks of the top 20 global automobile brands (Biesebroeck and Sturgeon, 2010).

However, it has become increasingly difficult for developing country suppliers to move up the value chain. Initially, the main

assembly plants were sourcing directly from the components suppliers and the assembling of modules/systems was done in-house. But global automobile brands have increasingly adopted a strategy of reducing the number of Tier I suppliers and sourcing the fully developed modules/systems rather than just the components. Moreover, to increase cost efficiency the brands have demanded the suppliers to serve the platforms, i.e. supply the same module/components/parts of the same quality and price to many locations and for multiple product models. Thus, suppliers must have the ability to expand production wherever the customer's facilities are.

This strategy demands that the suppliers have very high technological capabilities and a global presence. The investments needed to build such capabilities are beyond the capacities of developing country firms. Only in the newly industrialised countries, particularly South Korea, Taiwan and Singapore a few Tier I and Tier II suppliers have emerged. Therefore, automobile supplier firms of developing Asian countries are typically positioned in low value adding operations, mostly below Tier II levels. For example, at a foreign-invested manufacturer of fuel system components and wire harnesses in China, only five to six local suppliers were engaged and the local content was only around two per cent. Even for simple products, such as wire harnesses, 85 per cent of materials were imported from Japan and Korea. In general, the supply chains that are emerging in developing countries are increasingly foreign-owned and with very little space for developing country firms. As a general rule, the core design activities remain concentrated in advanced economies, and many parts and materials continue to be imported for assembly in the local plant (Sturgeon and Lester, 2004).

It is interesting to note that even if markets for automobiles are growing in developing countries, they still form only a small percentage of total markets and the developed countries still remain the major markets. This situation may not change soon. Therefore on the one hand, the prime factor behind the shift of automobile production to developing countries is the search for low cost production locations, and the size of markets is the second most important factor. On the other hand, the overall global demand for automobiles is far less than the global production capacities. At the end of the first decade of the 21st century, excess capacity was estimated to be roughly 24 million units, the equivalent of 96 assembly plants, and the capacity utilization rates worldwide have fallen significantly since the early 1990s (Doner et al., 2004). This is true for Asia as well. This situation is intensifying the competition among the global automobile brands and leading to further consolidation by mergers and acquisitions and the removal of other players from business. The consolidation in component industry has left behind only a few large players. These trends are visible more or less everywhere. There is also a tendency among auto manufacturers to merge or develop strategic alliances and share common platforms (i.e., using some common parts manufactured by the same suppliers). It is anticipated that only six assemblers will account for some 80 per cent of total vehicle output in the next decade, and only those assemblers producing four million units or more a year will survive (Doner et al. 2004).

These trends are further reducing the scope for Asian developing country suppliers to move up the value chain. We must keep in mind that the protective measures in most of the countries as well as the regional economic integrations (e.g. ASEAN) favour assembly over parts manufacturing, i.e., restrictions on import of vehicles, but not on parts and components. Moreover, there are increasing state interventions to promote the bilateral and multilateral trade in parts and components. For example, under the ASEAN Industrial Cooperation (AICO) program, firms pay only 0–5 per cent tariffs if 40 per cent of

the product's value originates in another participating ASEAN country, and under ASEAN Free Trade Area (AFTA) also automotive tariffs are reduced to 0–5 per cent. Foreign assemblers and suppliers have established more than 75 bilateral exchange programmes under AICO (Doner et al. 2004). India signed an FTA with Thailand in October 2003 with a provision applicable from March 2006, for duty reduction of 100 per cent from existing rates. It benefits, among others, Toyota's Indian auto component joint venture company, Toyota Kirloskar Auto Parts (TKAP), located near Bangalore. That firm was set up in 2004, and produces gearboxes for Toyota assembly plants in different parts of the world, including in Thailand (Nag, 2011).

In the above dynamics, some Asian developing countries, particularly those with larger home markets, were able to move up the value chain. For example, Malaysia with its early entry in the global value chain and technological advances that it was able to achieve, moved up the value chain and is one of the major players in manufacturing and export of transport equipments. Aided by their huge, growing domestic markets, many firms in China and India also were able to move to middle levels of value chain, and some, such as Tata Motors and Mahindra & Mahindra in India and Spice in China, emerged as globally competitive brands.

7. Apparel Global Value Chain

The apparel industry is generally considered a stepping stone for developing countries to boost export-led manufacturing growth and integrate into global value chains. It is one of the most labour intensive manufacturing sectors, and more than 25 million workers from developing countries are officially employed in the sector (ILO, 2005). In many developing countries, the textiles and clothing manufacturers together are the largest employers in manufacturing, accounting for up to 75 per cent of all jobs in Bangladesh and 90 per cent in Cambodia. The industry also accounts for a significant share of GDP in some developing countries (as much as 5 per cent in Sri Lanka, 12 per cent in Cambodia and 15 per cent in Pakistan). While textiles and clothing industries account for only a small percentage of total world manufactured exports (4.5 per cent in 2006), in some countries this sector accounts for a much higher percentage of export earnings, up to 80 per cent in Cambodia (Keane and Velde, 2008).

The global value chain in the textiles and apparel industry was launched in the late 1950s and early 1960s, when the production of textiles and apparel was increasingly outsourced from North America and Europe to Japan. Very quickly, the rapid rise in low-cost imports from Japan displaced a large part of the textiles and apparel production in Europe and North America. The second shift occurred during the late 1970s and early 1980s, when rising wages in Japan compelled manufacturers there to outsource a major part of their production to comparatively low-wage destinations of the comparatively more open economies of East Asia, i.e., Hong Kong, Taiwan and South Korea; and a triangular kind of value chain emerged, wherein Japan moved up the value chain.

But this arrangement was short lived and gradually the brands/buyers from North America and Europe started directly outsourcing to the firms in Hong Kong, Taiwan and South Korea. A third shift occurred in the late 1980s and early 1990s, when with rising wages at home and appreciation of their currencies, the firms in these countries started increasingly outsourcing the major part of their production to new low-wage destinations, mainly in the newly liberalised China, and to more open developing economies of Southeast Asia, such as Indonesia, Thailand, Malaysia and the Philippines, and also to Sri Lanka, the only country in South Asia that shifted to the export-led growth model as early as the late 1970s. It is

interesting to note that Taiwan, South Korea and Japan were compelled to appreciate their currencies vis-à-vis the dollar after the Plaza Agreement in 1985. During 1985–87, the Japanese yen was re-valued upward by nearly 40 per cent and the New Taiwan dollar by 28 per cent. In the period 1986–88, the Korean won also appreciated by 17 per cent. This was also a prime factor in particular period for a shift of production from these countries to other low cost destinations. In this process again a triangular kind of value chain arrangement emerged, with China and other Southeast Asian countries carrying out the labour intensive manufacturing operations and Hong Kong, Taiwan and South Korea moving up the value chain. The pattern and the dynamics involved was more or less the same as in the electronics industry discussed earlier. Textiles and apparel firms in newly industrialised countries followed the same path as the electronics firms and soon developed superior manufacturing capabilities and specialised in OEM and ODMs, i.e., emerged as full-range package suppliers with innovative entrepreneurial capabilities for the coordination of complex production, trade and financial networks. During the same period and in the same process firms in Singapore also moved up the value chain and emerged as OEMs and ODMs. This phenomenon is generally described as the flying geese strategy (Gereffi and Memedovic, 2003).

There is another factor linked with the above dynamics of the expansion of global apparel value chains in Asia: Various measures were adopted by North America and the European Union (EU) to protect their domestic industries from highly competitive suppliers such as China. Imports from all foreign countries were limited under a quota and preferential tariff system designed in the International Trade in Cotton Textiles (ICT) under General Agreement on Tariffs and Trade (GATT) in 1962. This was extended to include other materials under the Multi-Fibre Arrangement (MFA) in 1974. These 'arrangements' had several major impacts: On the one hand, a limit was put on outsourcing to and imports from those countries that were increasingly emerging as the most preferred producers, such as China. On the other hand, these arrangements helped in the further expansion of the apparel value chain to other low cost destinations, i.e., Southeast Asia (e.g., Indonesia, Thailand, the Philippines, Malaysia and Vietnam) and South Asian countries (e.g., Sri Lanka and Bangladesh). This system set the rules of the game for almost 30 years (Fernandez-Stark et al., 2011).

The real global shape and structure of the global textiles and apparel value chain emerged only after the phasing out of the MFA in 2005 with the adoption of the Agreement on Textiles and Clothing (ATC) under the World Trade Organization (WTO). With all the previous restrictions and control on outsourcing and trade in textiles and apparel by and large gone or reduced to the minimum, we observe a tremendous expansion and restructuring of the global textiles and apparel value chains across Asia.

In the meantime, there was a surge of larger number of unilateral trade agreements and preference schemes (to be phased out up to 2014–15 but may also be renewed) with specific apparel and textile clauses, in the name of easing the impact of the MFA phase-out. Examples include the CAFTA-DR Tariff Preference Levels (TPL) agreement between the United States and Nicaragua; the African Growth and Opportunity Act (AGOA), a U.S. scheme for sub-Saharan Africa; and the EU's Generalised System of Preferences (GSP) scheme "Everything but Arms," providing for duty free imports from certain least developed countries (Fernandez-Stark et al., 2011). The result of all these agreements in real terms was a flood of textile and apparel outsourcing from North America and Europe to low-wage locations all over the globe.

By and large the following factors determined the competitive advantage of various countries in terms of developing as major centres of the global textiles and garments value chain and their position in the value chain:

- a. Comparatively low labour costs and more liberalised economic institutions determine the most preferred destinations for low-value segments of the value chain, e.g., China, Cambodia, Bangladesh, India, Vietnam, etc.
- b. Early entry in the global value chains and specialization in design and full package suppliers, determine a higher place in the values chains, e.g., newly industrialised countries and some other early entrants in the value chain, such as Sri Lanka and Turkey.
- c. Generally the countries with significant presence of textile industries and better scope for diversification have better opportunities for moving up the value chain as full package suppliers.

Geographical location and dislocation of apparel production since 1990s took place in the following manner (Gereffi and Frederick, 2010):

- a. China, Bangladesh, India, Vietnam, and Cambodia emerged as steady-growth suppliers with an overall increase in market share since the 1990s.
- b. Indonesia and Sri Lanka experienced a loss in market share in some markets and gained in other markets; for example, Indonesia lost in the EU market but gained in the U.S. and Japanese market, while Sri Lanka lost in the U.S. and gained in the EU market.
- c. All past major suppliers, such as Hong Kong, South Korea, Taiwan and Singapore (which had all moved up the value chain), and also Malaysia, the Philippines, Macao (China) and Thailand have lost market share significantly in overall terms.

If we examine the geographical relocation of apparel production and increasing/decreasing share of apparel exports from 1995 to 2008 and the current size of workforce engaged in apparel sector, it is clear that China emerges as the single most important apparel production centre. Its share of apparel exports increased from 15 per cent to 33 per cent. The EU remains the second most important exporter (retaining its cumulative share at around 31 per cent). Other countries that gained from this relocation are primarily Bangladesh, Vietnam, Cambodia, India, Pakistan and Sri Lanka. The countries in Asia that lost some or the major part of their share include Taiwan, South Korea, Hong Kong, the Philippines, Malaysia, Thailand, Indonesia, and in other regions mainly the U.S., Mexico and Poland. We can see that currently about 50 per cent of apparel exports are produced in Asia. Similarly, the greatest portion of the workforce engaged in global apparel production is also in Asia: The largest workforce is in China, followed by Bangladesh, Pakistan, India, Sri Lanka and Cambodia.

8. Consequences of Global Factories

The concepts of GSC, GVC and GPC also help us to not only understand the evolution of global capitalism through global factories, but also understand how the new international division of labour results in a looting of natural resources of developing countries, how the wealth created in the developing countries is thereby increasingly transferred to the developed countries, and how in the process a tiny section of the elite in both the developed and developing countries benefit at the cost of the workers and the community as a whole. They

also gives us exposure to how environmental and occupational health and safety problems are increasingly transferred from developed to developing countries. This is not all. They also help us to understand how the working men and women are thrown into vicious circles of intensive exploitation in the developing countries and redundancy in the developed countries.

Asia is clearly emerging as the most important hub of such consequences of the global factories. The most arresting example is the garment sector, wherein Most big brands do not own or operate their own factories, and they are thus rightly referred to as hollow corporations. Rather, their executives sit in their corporate offices in the U.S., Europe, Japan, South Korea or Taiwan and send orders and designs for production of the required amounts of apparels to the hundreds of factories operating in low-wage countries, such as Thailand, Indonesia, China, the Philippines, Bangladesh, Cambodia, India, Mexico and countries in Eastern Europe. Without taking on any of the headaches involved in running the factories, they get the required supplies of their brand-name products in rapid time. In this outsourcing arrangement, the multinational brands are able to reap super profits by exploiting cheap labour and at the same time transfer all the economic (infrastructure), social and environmental costs of production and all the financial and operational risks to the subcontracting factories and the countries in which they operate. The same situation is emerging in other industries as well. For example in electronics, the production of almost all of Apple's iPhones and iPads is outsourced to the Taiwanese manufacturing firm Foxconn, which owns and operates factories in mainland China. The trend in the automobile industry is similar, except that in this case the brands still have a compulsion to run the main assembling operations in their own plants.

The new international division of labour has been established in such a way that the high value-added, capital and technology-intensive R&D operations are fully controlled by TNCs and are mostly based in developed countries, while low value-adding labour intensive operations are transferred to developing countries. By virtue of monopolistic control on markets, finances and crucial technologies and by using various investment strategies, TNCs are able to exercise effective control on whole value chains and put consistent pressure on the units in the supply chain for cost reductions. Subcontractors generally work for several TNCs simultaneously, but this diversification does not enhance their bargaining position vis-à-vis TNCs, because in this regard the TNCs collude rather than compete with each other. In overall terms it all results in wealth transfer from developing to developed countries.

It is interesting to note that the control over supply chains is putting such power into the hands of TNCs that they sometimes appear to be going mad in their use of extreme forms of labour coercion, such as ordering workers to run around the factory grounds in hot summer, slapping and hurling shoes at workers, as in incidents exposed in the case of Nike in Vietnam in 1998. However, Nike rejected all responsibility for such incidents, arguing that the abuse occurred in companies which were subcontractors and not in plants owned or managed by Nike (Foster et al., 2011).

Similar kinds of extreme labour coercion have been found all over Asia in the garment, electronics and auto component companies producing for TNCs. Through their control over the global supply chains, TNCs are able to put consistent pressure on subcontractors for cost reductions by intensifying competition among them and this ultimately results in dehumanizing the subcontractors in terms of intensifying the labour exploitation by all means to the extent possible, ignoring and flaunting all labour rights and human rights. By naming

Apple's subcontractor Foxconn Technology as the 'Run to Your Death' Company (Foster et al 2011), Chinese workers have indeed spelled out the ultimate price that these TNC strategies cost. Findings such as these raise the following question for research.

9. Agenda for Research

The study of global capitalism in terms of the study of global factories has put overwhelming emphasis on firm-level upgrading, i.e. how a firm improves its position within the value chains so as to generate and retain more value, as an indicator of development. There can be intra-chain upgrading whereby a firm moves up the same value chain from a more marginal to more secure position by increasing the range of functions performed (e.g. design or logistics management apart from basic production). There could be product upgrading, i.e. producing more sophisticated goods with higher unit prices. There could be process upgrading, i.e. improving technology and/or production systems. There could also be inter-chain upgrading, i.e. moving from one industry to another. A lot of research has been done on these ways of industrial upgrading. But the question as to how and whether the workers gain from these various upgrading ways that benefit owners and managers is not explored. To put it differently, there is research required to explain the widespread reality as to why upgrading from the vantage point of the firm leads to downgrading for the workers involved (Baer 2009; Baer, Undated; Barrientos et al. 2011). Empirical research on this, however, is conspicuous by its absence, especially in the Indian industrial landscapes, simply because it is not easy to do so (Bose, 2013). Nevertheless, the hypothesis to be disproved otherwise in this connection, that is haunting all of us suffering from Braverman's "nostalgia for an age not yet come into being", is nothing but the so far unbeatable polarising-skills thesis of Braverman's analysis of division of labour between the design and execution of industrial production (Braverman, 1998). This is nothing but Marx's thesis about the tendency towards the polarisation of working conditions under capitalist development—that is, the degradation of work for the vast majority and the upgrading of work for a relative few. To put it differently, the persistent miserable realities of work, workers and working conditions under capitalism have been due to the persistence of Taylor's principles of scientific management and Fordist speeding up of work that followed them later on in the day to day workplace administration. The fairly rigorous study that has been lately done by Butollo (2014) has only confirmed the widespread existence of Braverman's ghost in the Asian global factories of the Pearl River Delta!

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