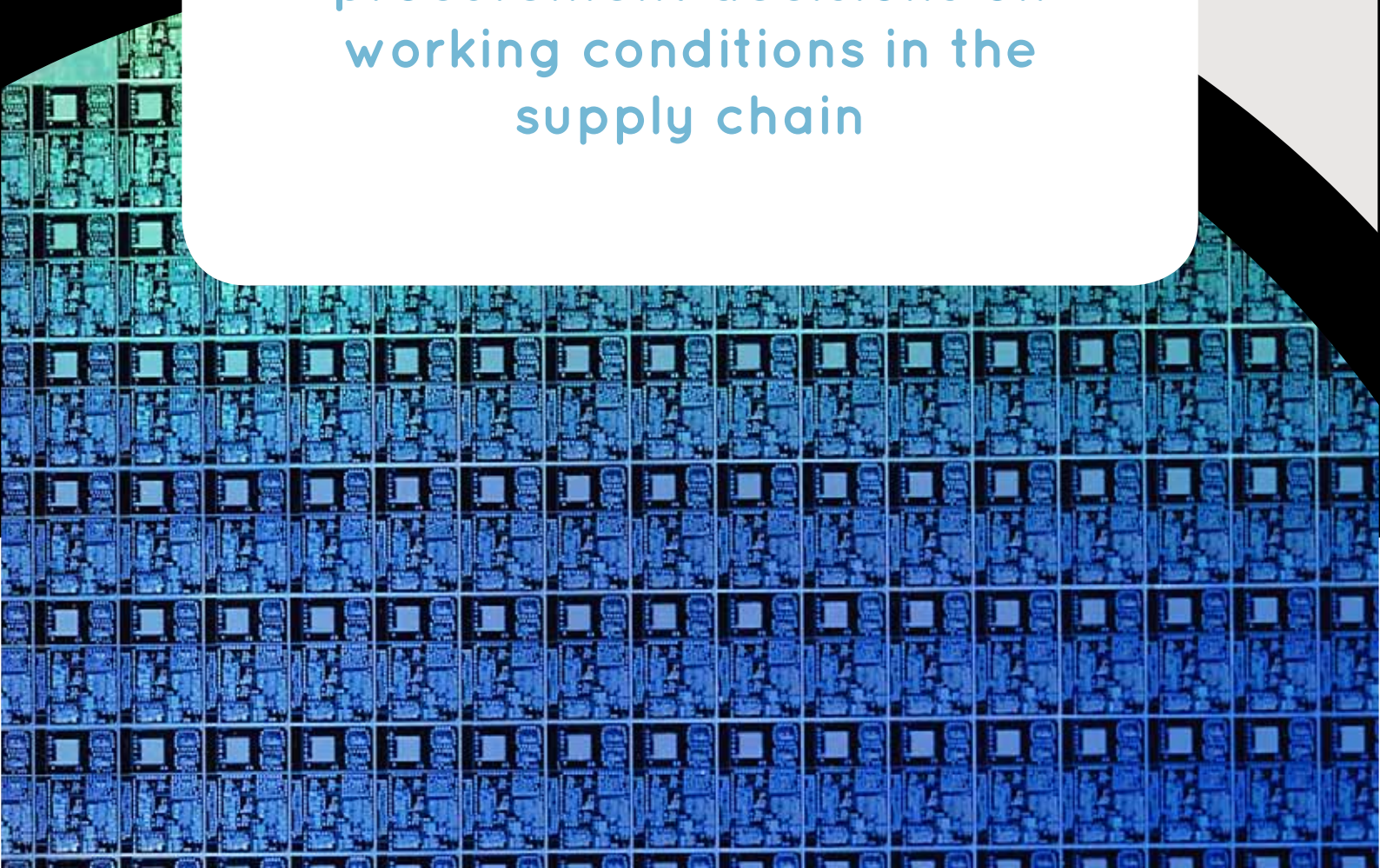
electronics watch

Improving working conditions in the global electronics industry

The ICT sector in the spotlight

Leverage of public procurement decisions on working conditions in the supply chain



The ICT sector in the spotlight
Leverage of public procurement decisions on working conditions in the supply chain

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Contents

1. Introduction

Information and communication (ICT) products and the ICT industry itself are archetypal examples of our increasingly globalised world. ICT products play a major role in our lives in terms of global communication and providing information – both in our private and professional lives. This is true for both private consumers as well as for public purchasers, in industrialised countries as well as in developing countries. Public procurers are major consumers of ICT. In Europe alone, public procurers spend billions of euros on ICT hardware every year.

The ICT hardware sector is also a complex and diversified industry with supply chains crisscrossing the globe – from the extraction and processing of raw materials to the worldwide manufacturing of various components right through to the final assembly of products. Then, at the very end of the whole process, there is the illegal return of problematic e-waste to Asia and West Africa – a result of products with a very rapid life-cycle.

As in other sectors, unfortunately globalisation goes hand in hand with the exploitation of workers in the ICT sector throughout the supply chain. ICT hardware manufacturing, which is the focus of this report, emerged from integrated forms of production to outsourcing and specialisation in complex networks of 'fabless'[1] brands, large contract manufacturers and a variety of small- and medium-sized component suppliers in low-cost countries.

Many developing countries consider the presence of the ICT industry as a chance for development in their countries. This often leads to a policy that disregards the well-being and interests of workers. This problem is rife in the export production zones in several countries, where not only tax reliefs, but also harsh working conditions, no trade union policies (e.g. in the Philippines) and dormitory regimes (e.g. in Malaysia and China) rule the sector. Even in countries with strict labour laws and regulations (e.g. in China or Vietnam), there is a huge discrepancy between theory and practice, due to a (partly deliberate) lack of controls and sanctioning.

The working conditions differ from country to country, but what most countries have in common is: poor wages; excessive working hours; risky working conditions due to the increase of temporary agency workers; discrimination against student and migrant workers; and a lack of safety precautions for the use of hazardous substances.

Apart from the indifference of both companies, consumers and financiers towards these issues, there are three fundamental structural features causing these exploitative conditions: the pricing competition in the market; the high flexibility and rapid turnover of products in the sector; and a lack of transparency in the supply chain. The falling prices for highly complex products is prompted by a

1 'Fabless' refers to the business methodology of outsourcing the fabrication of products and components to a specialised manufacturer.

business model where the hardware products get cheaper in return for selling software and telecommunication contracts. Combined with high profit margins for the brand companies, this leads to price pressures that are passed on directly to ICT suppliers and their workers. Regular peaks in production due to the launch of new products and seasonal demands are common; thus the workload in factories is not fixed, causing extreme demands for overtime and increased hiring of temporary workers. The supply chain is so diversified and so confusing and complex that even brand companies claim they are unable to retrace the products in their own supply chains.

In several countries, workers have begun to fight for their rights by going on strike and through other means. Both in producing countries and in countries at the buying end of the supply chain, several non-governmental organisations (NGOs) have also been trying for many years to improve working conditions and to provide more transparency in the global supply chain. This has led to more public and corporate awareness of the exploitative conditions in this sector. However, there is no real change in sight yet.
The new global initiative Electronics Watch is currently developing a monitoring organisation for global ICT hardware production. With the help of both public purchasers in Europe and the US and labour organisations in the producing countries, the aim is not only to monitor the production of ICT products in their global supply chain, but also to be a driver of a reform programme that might lead to a long-term change of working conditions in this industry.[2] In order to achieve this, disclosure and transparency are key elements.

This report turns the spotlight on the ICT industry by looking at some of the following questions:

- Which ICT companies are (currently) the leading companies – both at the level of brands and at the level of the increasingly influential contract manufacturers?
- In which countries do these companies and their suppliers operate?
- What are the main social issues in these countries?

A key question for this report is: What leverage do consumers, including public procurers in Europe, have to change the exploitative conditions in this industry?

The methodology used to compile this report included desk research (e.g. literature reviews, current market research, annual and financial reports of major companies). This was supplemented by interviews with experts on ICT production or with knowledge of specific countries.

Chapter II includes a short analysis of ICT hardware products bought by public procurers. Chapter III turns the spotlight on the leading ICT companies – from brand names to contract manufacturers. Chapter IV provides an analysis of the most important countries supplying the ICT sector. And Chapter V presents some overarching conclusions for consumers who are interested in seeing a socially responsible ICT sector, particularly public purchasers.

2 For more details, please see www.electronicswatch.org.

II. Public sector: A major buyer of ICT products

The public sector in Europe is a major buyer of ICT products. While current data is not available on the total public ICT spending in Europe, estimates are around €94 billion in 2007 (European Union 2012: 4). Two examples of European member states show the ongoing enormous annual ICT spending of the public sector. Current data suggest that the UK public sector spent around £13.8 billion on ICT products (including services) and around £2.1 billion on ICT hardware (OFT 2014: 29). Annual ICT spending of the public sector in Germany is around €20 billion and around €2.4 billion for IT hardware (Bitkom 2013a) and continuously growing (Bitkom 2013b).

According to our analysis of the European public procurement journal TED-database (Tenders Electronic Daily), the main products purchased by public procurers include portable computers and printers, followed by display screens, desktop computers, media storage and reader devices and magnetic or optical readers.

Table 1: Public procurement of ICT hardware (expressed in number of calls for tenders)
Source: TED 2013, cf. ted.europa.eu/

Product	1-year period (number of calls for tenders 1.5.12-1.5.13)	4-year period (number of calls for tenders 1.5.09-1.5.13)
Portable computers	1,930	6,397
Printers and plotters (computer printers for printing vector graphics)	1,830	5,850
Display screens	1,016	3,547
Desktop computers	984	3,204
Media storage and reader devices	879	3,050
Mainframe computers	672	2,544
Magnetic or optical readers	640	2,153
Storage media	605	1,965

In contrast to private consumers, mobile phones and tablets are bought significantly less by public purchasers.

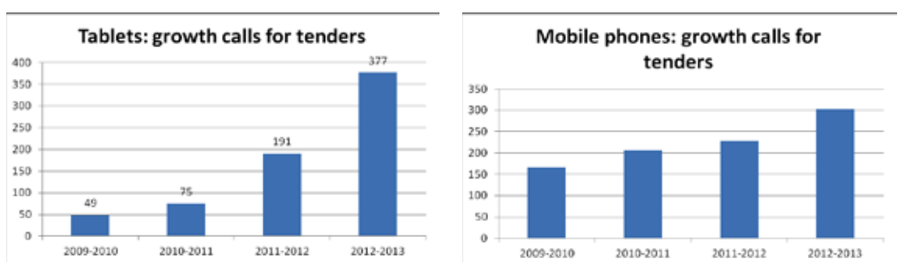
Table 2: Public procurement of mobile phones and tablets (expressed in number of calls for tenders)

Product	1-year period (number of calls for tenders 1.5.12-1.5.13)	4-year period (number of calls for tenders 1.5.09-1.5.13)
Mobile phones (including smartphones, cell phones and car phones)	303	908
Tablets	377	692

Source: TED 2013, cf. ted.europa.eu/

Figure 1 illustrates the growing increase in public procurement of tablets and mobile phones over the last five years. This reflects the fact that gradually more public workers are receiving business mobiles from their employers.

Figure 1: Public procurement of tablets and mobile phone over five years



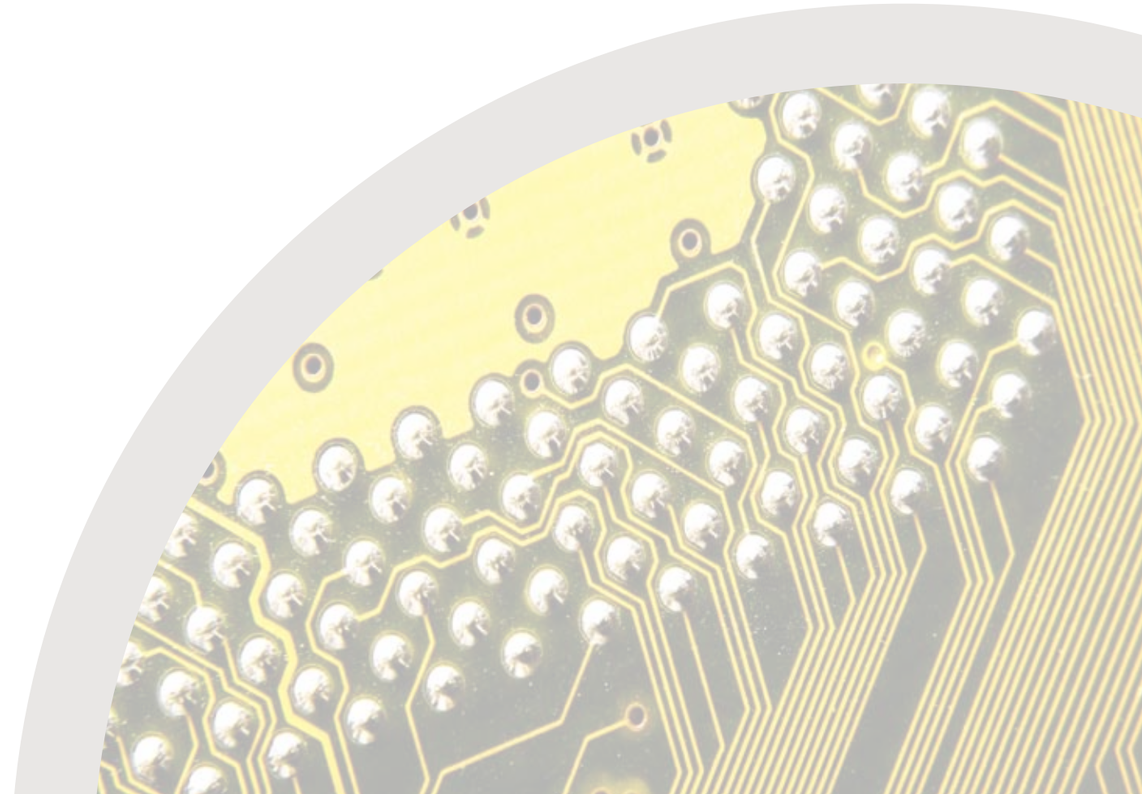
Source: TED 2013, www.ted.europa.eu/ (illustration by WEED)

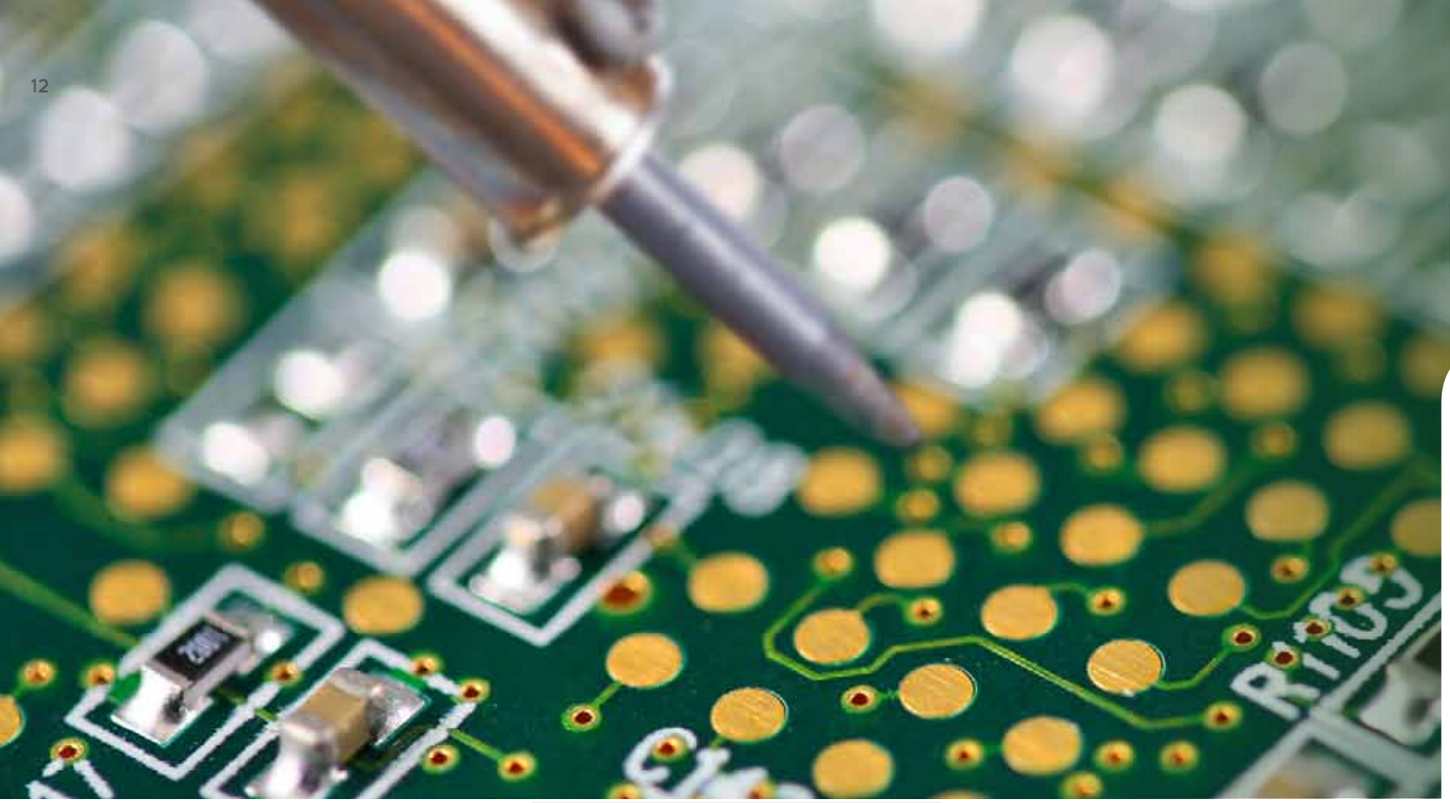
The leverage of the public sector over the ICT industry does not only derive from their large annual spending on ICT hardware, which brand companies – as shown in the paragraph below – do not want to miss out on. It also stems from the fact that public procurers often purchase ICT products through long-term contracts, which gives an extra economic weight to their tenders. Furthermore, increasingly public buyers are realising that they strengthen their market power and their bargaining position when they join forces. Some examples of this include the Swedish county councils,[3] the Northern federal states in Germany (Hooper 2014: 8) and more and more public entities that are joining the new Electronics Watch initiative.[4] Accordingly, suppliers that sell socially innovative products are encouraged, since public purchasing takes social issues into account.

The example of Dell, one of the most popular brands in the public sector due to its modular composition of ICT products, and also of Hewlett-Packard (HP), shows that brand companies regard public sector buyers as important customers. In the fiscal year 2012, US $16 billion of Dell's net revenue came from public buyers (Dell 2012: 40) and thus 26% of its total global segments (Ibid: 41). HP does not provide a detailed breakdown of its customers, but the company explicitly discusses its public sector performance and strategies to enhance the numbers in its 2013 Annual Report: "Revenue performance in ES [= Enterprise Services] continues to be challenged by several factors that impact the demand environment, including weak public sector spending in the United States and austerity measures in other countries, particularly in the United Kingdom, and weak IT services spend due to the mixed global recovery, particularly in the EMEA region" (HP 2013: 43).

3 Socialt Ansvarstagende i Offentlig Upphandling, cf. http://www.hållbarupphandling.se/ and see http://www.youtube.com/watch?v=JiXoLwURueo (example at minute 10:20).
4 www.electronicswatch.org

Noticeably, the strategy discussed to overcome weak public sector spending, "includes a cost reduction initiative to align our costs to our revenue trajectory and initiatives targeted at improved execution in the areas of sales performance and accountability, contracting practices and pricing" (Ibid: 63). Nevertheless, an HP manager stated in an interview that HP faces pressure for ongoing and improved supply chain governance, and ranks public procurers as one of the most significant drivers in this regard (Raj-Reichert 2012: 110-111). Other companies that discuss the public sector market in their investment reports include major brands such as Fujitsu and Cisco (Fujitsu 2013: 97; Cisco 2013: 12). This shows the importance of action by public purchasers, particularly in terms of making ICT companies and distributors aware that social criteria regarding working conditions in the supply chain of the product are influential when it comes to winning bids.





III. Company-based mapping

1. From integration to verticalisation

ICT production has been characterised by several significant developments in the past 30 years. Until the 1980s, companies like IBM, offering more or less closed systems with integrated hardware and software, dominated the market. These companies controlled a large number of steps involved in creating ICT hardware. This so-called vertically integrated production process was replaced by another model in the 1990s: the rise of specialised companies. In particular, Microsoft and Intel, which provided key components for personal computers (PCs), grew bigger and changed the market with their rapid innovation cycles.

As the market concentration of these key component producers grew, they were able to set new standards. A major characteristic in this process was the separation from product innovation and product manufacturing. While the vertical disintegration of ICT production continued, more and more production steps were outsourced to contract manufacturers (Beck 2012: 12). Contract manufacturers without their own brands such as Flextronics and Solectron (which was bought by Flextronics in 2007) from the US or Quanta and Honhai/Foxconn from Taiwan became gradually more important. These companies offered cheaper production conditions. Meanwhile IBM, Siemens and other brand companies sold their own manufacturing facilities – including machinery, inventory and employees – to contract manufacturers (Van Liemt 2007: 1) in order to cut their labour costs down and to concentrate on new business models like marketing or consulting.[5]

Thus many brands do not manufacture (or even design) their own products any more. The majority of PC brands have very limited or no production facilities. In the case of notebooks, as long ago as 2006 Dell, HP, Acer and Apple no longer had their own notebook manufacturing operations. At the same time, Toshiba was partly manufacturing its laptops, and only Sony, Fujitsu-Siemens and Asus/Asustek owned manufacturing plants (Manhart/Grießhammer 2006a: 27).

The mobile phone market shows similar structures. Only a few brands still have their own production facilities, e.g. Samsung Electronics (a subsidiary of Samsung), LG Electronics and Nokia (Wu 2013).

In spite of the global trend of extensive outsourcing, some brand companies still have their own production facilities, often owned by their subsidiaries. These companies produce in a vertically integrated way, thus reducing their dependence on contract manufacturers.[6] This is especially true for the South Korean company

5 For example, IBM acquired the consulting arm of PriceWaterhouseCooper; HP acquired EDS consulting; Dell acquired Perot Systems (Sodhi/Tang 2012: 9).

6 See Lüthje et al (2013a), p. 144, with examples of Samsung's manufacturing complexes in China in Tianjin and Suzhou and additional mentions of newer Chinese multinationals such as Haier, TCL or Konka (mainly producing consumer electronics).

Samsung with its several affiliated companies. Samsung manufactures components (chips, display panels and other electronic parts; e.g. chips that are also purchased by Apple) and assembles their own smartphones and other devices (Chenn and Pfanner 2013). Samsung owns production lines in its domestic market in South Korea (Sejong and Buson) as well as abroad, where 80% of Samsung Electro-Mechanics' production takes place, i.e. in China (Dongguan, Tianjin, Kunshan, Goaxin, Shenzen, Huizhou, Shandong, Suzhou, Binhal), Thailand (Nakhon, Ratchasima, Bangpakong), the Philippines (Calamba) and Hungary (Szigetszentmiklós).[7]

LG Electronics, headquartered in South Korea, controls 114 local subsidiaries worldwide with roughly 87,000 executives and employees.[8] These subsidiaries have production facilities all over the world – with ten sites in Asia, four in the Americas (including Brazil and Mexico), but also in Poland, Turkey, Russia, Egypt, South Africa and Saudi Arabia. In stark contrast to this, US-based Cisco states in its 2013 Annual Report: "We rely on contract manufacturers for all of our manufacturing needs" (Cisco 2013: 12). The same is true for US-based Apple: "Substantially all of the Company's hardware products are manufactured by outsourcing partners that are located primarily in Asia" (Apple 2012: 69).

2. Contract manufacturers: key actors with low profit margins

Contract manufacturers have become key actors in the electronics market. Brand companies outsource close to 75% of their production to contract manufacturers (Holdcroft 2009). And contract manufacturers accounted for 20% of all manufacturing revenue in 2011 (Dinges 2012). Market researchers still expect growing revenues of global electronic contract manufacturers and a rise from US $360 billion in 2011 to more than US $400 billion in 2015 (Ibid).

Although contract manufacturing plays a significant role in the production process, the profit margins for contract manufacturers are low, while the large profit margins are reserved for brand companies (Van Liemt 2007: 23; Ojo 2013). Thus the leading Electronics Manufacturing Services (EMS) companies such as Foxconn (Taiwan), Flextronics (Singapore), Jabil Circuit (US), Celestica (Canada) and Sanmina-SCI (USA) – which accounted for 70% of the market share over the period from 2001 and 2009 – only had profit margins between 2% and 3% from 2004 to 2009 (Sodhi/Tang 2012: 4). In this context it is notable that the brand company Apple has liquid assets amounting to US $137 billion (Postinett 2013). Some researchers suggest that ensuring low profit margins for contract manufacturers is an instrument of subordination to prevent their investments and upward mobility (Froud et al 2012: 15-16).

One strategy to increase the margins for contract manufacturers and to minimise their risks is to develop a long-term partnership with the brand companies. Thus Foxconn established a new plant in India in 2006 to supply customers like HP and Dell and a new plant in Brazil in 2005 to support the expansion plans of Nokia in Brazil (Ibid: 5). Another strategy is to pass the price pressure on to their respective suppliers, which leads to low wages and work pressure for IT workers further down the supply chain (Froud et al 2012: 17-18, 20).

7 See details on http://www.samsungsem.com/support/place_overseas01.jsp?lang=en and http://www.chinalaborwatch.org/pro/proshow-177.html
8 See http://www.lg.com/global/about-lg/corporate-information/global-operations

3. Production types of contract manufacturing

The most common distinction of production types differentiates between **OBM (Original Brand Manufacturer), OEM (Original Equipment Manufacturer), EMS (Electronics Manufacturing Services) and ODM (Original Design Manufacturer)**.

While OBM (Original Brand Manufacturer) is the 'classic' own production by brand companies, in the OEM model (Original Equipment Manufacturer) as the 'classic' outsourcing model, the brand company is the customer. They determine and control the product and technical manufacturing specifications that are carried out by contract manufacturers. Today the outsourcing goes much further. In the EMS model (Electronics Manufacturing Services) – a model that goes back to US contract manufacturers like Flextronics, Celestica or Sanmina – the EMS contract manufacturers coordinate the production themselves, while the product development itself still stays with the brand company. The EMS contract manufacturer coordinates and controls all of the manufacturing processes, including production-related engineering, component purchasing from sub-suppliers and after-sales services. Thus they have comprehensive, independent production know-how.

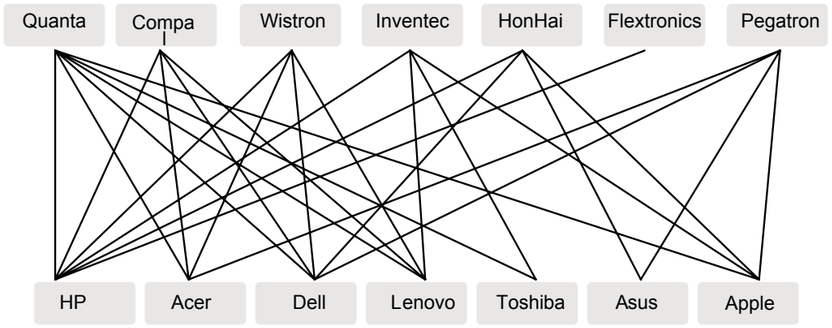
The ODM model, initially invented by Taiwanese companies, goes one step further. The ODM contract manufacturer offers a comprehensive service in both the technical system development and the product design (Beck 2012:13). ODM contract manufacturers are responsible for the design, the development and final testing of their manufactured 'ready-to-go' products (Sodhi/Tang 2012: 7), while the brand companies are reduced to marketing and key elements of brand development.

In practice, the lines between EMS- and ODM contract manufacturers are often blurred (Beck 2012: 13), as some EMS companies enhance their design know-how and further expand their business segments. However, the differences between ODMs and brand companies vanish when ODM companies broaden their research and distribution capacities and supply their products with their own name to the market. Acer has gone through such a transformation, as the company changed from contract manufacturing before 2000 to the development and branding of its own products (Van Dijk/Schipper 2007a: 8). And this might also be the case with Honhai/Foxconn, which announced it was launching its own tablet in cooperation with Firefox (Santos 2013). This development is partly a consequence of the above-mentioned unequal distribution of profits.

4. Global supply chains

ICT supply chains are characterised by a cross-interlocking of business connections. All brand companies work with several contract manufacturers. Equally the contract manufacturers try to diversify their business relations by spreading their networks across different brand companies. This is illustrated in Figure 2, which uses the example of notebook production in the following scheme of the major notebook brands HP, Acer, Dell, Lenovo, Toshiba, Asus and Apple.

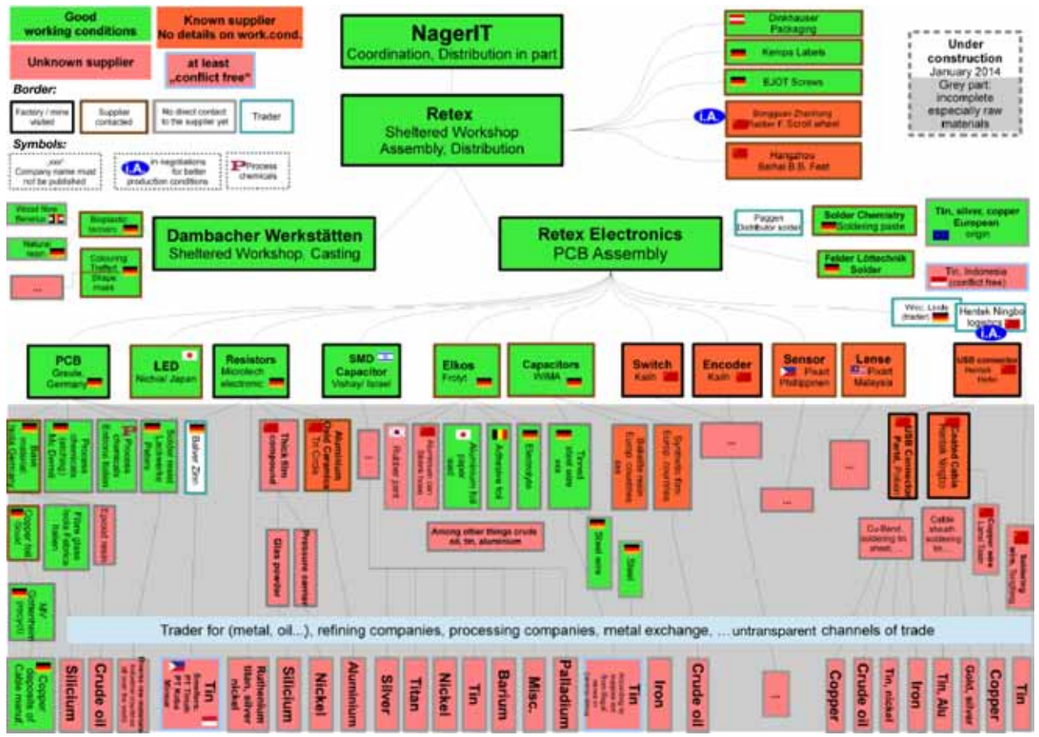
Figure 2: Major notebook supply relationships – brands and contract manufacturers 2010



Source: Research in China[9] (illustration by WEED)

Beyond the first layer of contract manufacturers, there is a further complex supply chain. This complexity is illustrated by the example of a small and relatively simple IT product such as the computer mouse provided by the German company NagerIT. This company is an exception in the ICT sector, as it strives for absolute transparency in its supply chain (see Figure 3).[10]

Figure 3: Supply chain for computer mouse of German company NagerIT



Source: © NagerIT 2014[11]

9 See http://www.researchinchina.com/Htmls/Report/2011/6038.html
10 Another company with aspects of transparency is Netherland FairPhone, which discuss a few details on the supply chain in its blog: http://www.fairphone.com/2013/12/10/made-with-care-social-assessment-report/; http://www.fairphone.com/2013/12/20/production-photo-blog/
11 See https://www.nager-it.de/static/pdf/en_lieferkette.pdf

As a further example, notebooks are composed of approximately 2,000 components (Manhart/Grießhammer 2006a: 24). These components are produced in several manufacturing steps. Figure 4 illustrates a simplified version of the typical manufacturing chain.

Figure 4: Typical manufacturing chain of a notebook

	Production stages	Products and intermediate products										
6.	*Marketing*	Branded notebook										
5.	*Final assembly*	Notebook										
4.	*Assembly of complex components*	Motherboard and network card	LCD display	Optical drive	Hard disk	Keyboard	Touchpad	Battery pack	Power supply	Cooling system	Case	Other
3.	*Manufacturing of single components*	Microchips	Passive electronic components	Printed circuit boards	Cables	Operator controls	Plug connections	Screw connections	Battery cells	...	...	
2.	*Refining of raw materials*	Silicon wafers	Glass products	Raw plastic products	Copper products	Copper-zinc products	Aluminium products	...	...	Palladium products	Tantalum products	...	...
1.	*Resource extraction*	Quartz sand	Crude oil	Copper ore	Zinc ore	Bauxite	...	Palladium ore	Tantalum ore	...	Scrap metal	

Source: © Manhart/Grießhammer 2006b: 24[12]

The brand company covers marketing and sales activities and purchases 'strategic components' like central processing units (CPUs), hard disks and graphic chips. The contract manufacturers offer the assembling of the notebooks and coordinate the purchasing of most components and partly manufacture printed circuit boards or mechanic components themselves (Ibid). The components consist of further small parts. For example, hundreds of components are necessary for a hard disk alone.[13] These components are manufactured by a diverse range of suppliers. The majority of component suppliers – apart from those that are highly specialised – are easily replaced by others if necessary and thus have very little power and leverage (De Haan/Schipper 2009: 17).

Both the audits of brand companies themselves, external audit companies or certification companies like TCO Development and the company-driven initiative Electronic Industry Citizenship Coalition (EICC)[14] usually only monitor the companies in the first tier of the supply chain, i.e. the assembling factories. The EICC logic is that not brands, but first-tier suppliers are responsible for implementing the EICC code with their suppliers (Raj-Reichert 2012: 127). Thus it is not surprising that case studies in literature and NGO reports about labour issues in the ICT sector are mostly restricted to the first tier, too. This report cannot overcome these shortcomings. However, the report can point out responsible brands and contract manufacturers (see below) as well as highlight possible opportunities for improving the status quo.

Some research literature goes deeper than the first tier of the supply chain.[15] Furthermore, a few companies – Apple, Dell, HP and IBM – list their suppliers online, which is an important step towards more supply chain transparency. However, the level of disclosure across these companies is very different with regard to detail and complexity:

12 See Manhart/Grießhammer (2006a: 24): "The diagram does not show the relationships between the vertical levels, [...] In particular, the relationships between tiers 2, 3 and 4 are so diverse as to render a graphical representation impossible in the present context."
13 See https://sourcemap.com/view/4776
14 See http://www.eiccoalition.org/
15 See selected literature in the Appendix.

Apple lists 748 suppliers with addresses in an updated suppliers' list for production in 2012 (list published in 2013). This includes the company's top suppliers, including component providers and others "representing at least 97% of procurement expenditures for materials, manufacturing, and assembly of our products worldwide in 2012".[16] The majority, more than 600, are based in Asia, with 331 suppliers alone in mainland China. Other main sites in Asia include Japan (148), South Korea (38), Taiwan (35) and Malaysia (27), but also Vietnam, the Philippines, Singapore and Thailand. 84 suppliers are listed in the US and 46 in Europe. Further details about which products Apple purchases from these suppliers are not provided in this list, but in a minor list of 17 of Apple's final assembly facilities.[17] This specifies which contract manufacturers assemble the specific products and where this is done.

HP provides a list that represents 95% of its procurement spend for materials, manufacturing and assembly.[18] The list includes final assembly suppliers, which partly includes contract manufacturers and commodity and component suppliers. It contains further information about the product type, the production address of the suppliers and links to corporate social responsibility reports. For example, suppliers for HP printers are: Flextronics with production facilities in Brazil, China, Malaysia and Singapore; HonHai/Foxconn with their plants in China; Jabil Circuit with factories in China; the New Kinpo Group, which manufactures in China and Thailand; and the Venture Corp., which produces in Malaysia. Additionally HP is sharing the number of reported hourly employees dedicated to the production of HP products at final assembly supplier facilities.

IBM provides a list of suppliers that accounts for 90% of its global spending.[19] This list contains 50 suppliers of the company's hardware and logistics procurement. IBM works together with contract manufacturers like Flextronics, Wistron, HonHai/Foxconn, Jabil Circuit and Celestica.

Dell lists its "95-percent-spend and key supply chain partners" and links social responsibility reports and information about sustainability programmes, if available.[20] Dell lists about 130 suppliers including Compal Electronics, Flextronics, HonHai (Foxconn), Pegatron and Wistron. From the four suppliers that were visited by Danwatch and criticised for their lack of labour rights in an investigative report published in 2013 (Stracke et al 2013), only MSI (Shenzhen, Guangdong Province) and Delta Electronics Group (whose subsidiary Taida Electronics in Dongguan, Guangdong Province, was visited) are mentioned in the Dell disclosure list. Mingshuo (Suzhou, Jiangsu Province, China) and Hipro Electronics (Dongguan, Guangdong Province, China) that are part of the Chicony Power Technology Group do not appear.

It is often said that even the brand companies themselves do not know their sub-suppliers further down the supply chain, or they only know suppliers as far down as the second or third tier. Given these statements, it is remarkable that at least Apple states that it has direct contracts with and negotiates prices with almost all its suppliers and sub-suppliers directly.[21] Thus Apple purchases components directly from suppliers and sells them to manufacturing vendors that manufacture sub-assemblies or assemble final products for Apple (Apple 2012: 56). The direct purchasing of components by brand companies is generally a brand principle for key components with major impact on the price (Manhart/Grießhammer 2006a: 26). It is also documented for Motorola, HP and Siemens (Lüthje 2006: 22). Although HP does not have direct contracts with its sub-contractors, the company pre-selects suppliers and places them on approved vendor lists, which are handed over to first-tier suppliers, e.g. at Penang sites in Malaysia (Raj-Reichert 2012: 176).

The lack of public knowledge about further tiers in the supply chain is a key challenge for labour rights in the electronics industry. Often the worst working conditions (and also environmental issues) are to be found further down the supply chain.[22]

Brand companies cannot absolve themselves of their responsibilities by stating that they do not have direct contracts with their sub-contractors. Thus HP, as one of the leading initiators of the EICC initiative, still leaves responsibility for second tier suppliers in terms of compliance with the EICC code with contractual partners in the first tier. As shown in research on Malaysia, the consequence is that "second tier suppliers are left out of the governance efforts by HP and [...] they fall into an overall governance gap in the GPN [global production network]" (Raj-Reichert 2012: 129). The transfer of responsibilities is not only less effective, but also ignores the fact that existing labour conditions in the ICT sector are not just a by-product (Beck 2012: 11; Raj-Reichert 2012: 126). Short product life cycles, the competition on low prices and the need for flexibility are all directly linked to low wages, overtime and temporary employment via labour agencies. Consumers and particularly public procurers can play an important catalysing and leveraging role by calling for wider and more efficient access to the lower tiers of the supply chain and by calling for the brand companies to acknowledge their responsibility.

5. The leading companies

a. Brand companies

i. The major brands related to products

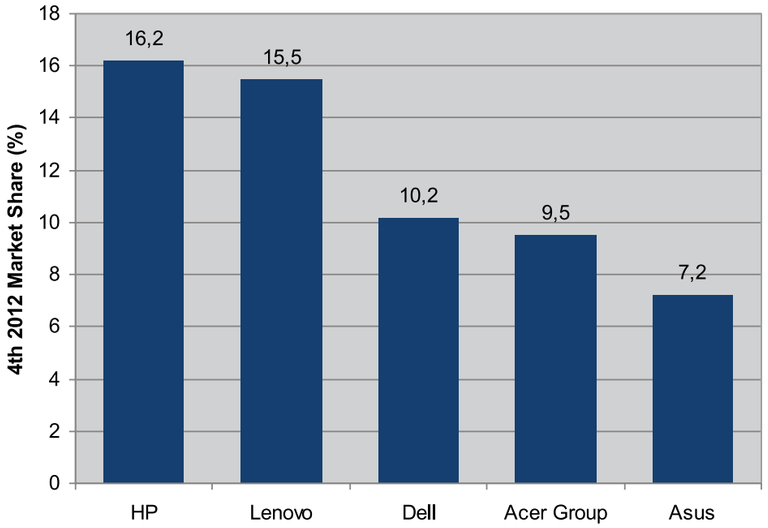
The following section provides information about market shares of the biggest brands in the market related to some of the key products bought by public procurers.[23]

16 See Apple website at http://images.apple.com/supplierresponsibility/pdf/Apple_Supplier_List_2013.pdf. An interactive map based on Apple's supplier list 2013 is to be found here: http://www.chinafile.com/who-supplies-apple-it-s-not-just-china-interactive-map
17 See Apple website, http://www.apple.com/supplierresponsibility/our-suppliers.html.
18 See HP website, http://h20195.www2.hp.com/V2/GetPDF.aspx/c03728062.pdf
19 See IBM website, http://www.ibm.com/ibm/responsibility/2011/supply-chain/
20 See Dell website, http://www.dell.com/Learn/us/en/uscorp1/corp-comm/cr-ca-list-suppliers?c=us&l=en&s=corp
21 Meeting by SOMO's Irene Schipper with Apple's Labor & Human Rights Manager, Supplier Responsibility, 1 November 2013, in Amsterdam.
22 For the mobile phone companies, see Chan et al (2008:18); for the printed circuit board industry, see Raj-Reichert (2012: 17).
23 The following statistics are based on figures from fourth quarter of 2012, which show a consistent trend in comparison with the fourth quarter of 2011.

(1) PC market: notebooks and desktop PCs

The main five companies on the PC market[24] account for almost 60% of the global market share: HP (US), Lenovo (China), Dell (US), Acer Group (Taiwan) and Asus (Taiwan). In spite of small changes among these companies, this trend has been stable in recent years. In the fourth quarter of 2012, HP sold more than 14 million PCs and had a market share of 16.2%. Lenovo follows closely behind with 13.9 million PCs sold and a worldwide market share of 15.5%. Dell sold around 9 million PCs and held 10.2% of the market share in the same time period. The Acer Group (8.6 million/9.5%) and Asus (6.5 million/7.2%) followed closely behind.

Figure 5: Worldwide PC vendor unit shipments, 4th quarter 2012



Source: Gartner (January 2013),[25] illustration by WEED

Apple was sixth, with a market share of 5.8%, followed by Toshiba (4.5 %), Samsung (4.3 %), Sony (2.3 %) and finally Fujitsu (1.7 %).[26]

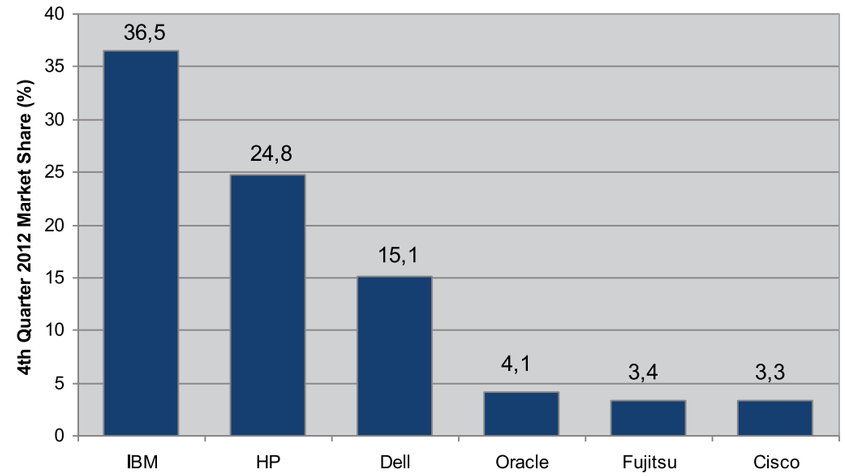
Looking specifically at the market shares in Western Europe, the same companies dominate the market, while HP has an even clearer leadership position with 21.5% market share.[27]

(2) Server market

A few companies dominate the server market, which is worth US $15 billion. These companies account for almost 90% of the worldwide market share: IBM (US), HP (US), Dell (US), Oracle (US), Fujitsu (Japan) and Cisco (US). The biggest company, IBM, had a revenue around US $5.3 billion and had a market share of around 36.5%.[28] HP follows with US $3.6 billion and a market share of 24.8%, while Dell had a revenue of more than US $2.2 billion accounting for 15.1% of the market share. They are followed at some distance by Oracle, Fujitsu and Cisco, which together share around 10% of the market.

24 PC market is understood as including desk-based PCs and mobile PCs, but does not include media tablets.
25 See http://www.gartner.com/newsroom/id/2301715
26 See https://technology.ihs.com/417277/fast-facts-on-apples-pc-outsourcing
27 Gartner February 2013, www.gartner.com/newsroom/id/2337015
28 All figures from the fourth quarter of 2012, consistent with the rating in 2011.

Figure 6: Worldwide server systems factory revenue, 4th quarter 2012

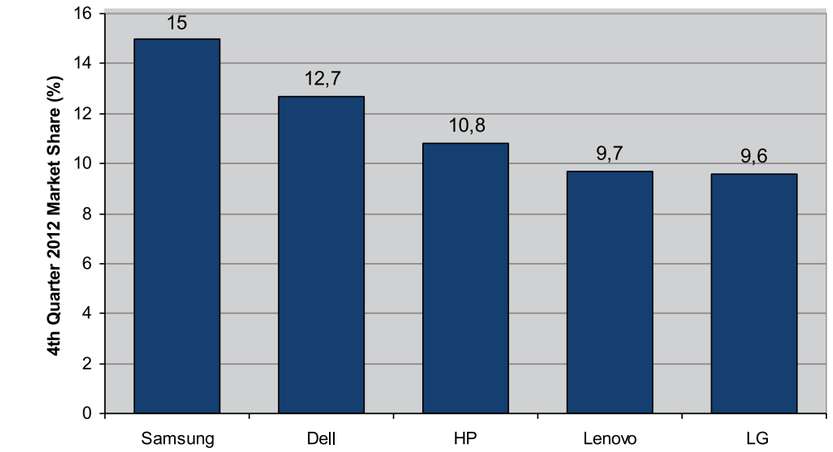


Source: IDC's Worldwide Quarterly Server Tracker, February 2013[29] (illustration by WEED)

(3) Monitors

The top five worldwide PC monitor vendors are: Samsung (South Korea), Dell (US), HP (US), Lenovo (China) and LG (South Korea). Samsung as the worldwide leading company sold around 5.4 million units in the fourth quarter of 2012, accounting for a market share of 15%. Dell sold 4.6 million units and had a market share of 12.7%. HP follows with a market share of 10.8%. Lenovo and LG had a similar market share of around 9.7% and 9.6% respectively.

Figure 7: Worldwide PC monitor vendors, 4th quarter 2012



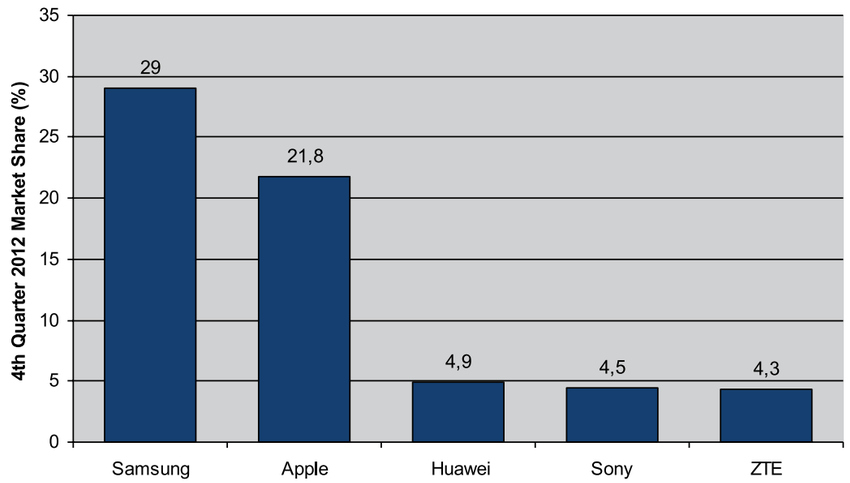
Source: IDC's Worldwide Quarterly PC Monitor Tracker, March 2013[30] (illustration by WEED)

29 Worldwide server systems factory revenue, 4th quarter 2012. http://www.idc.com/getdoc.jsp?containerId=prUS23974913 (accessed in December 2012)
30 Worldwide PC monitor vendors, 4th quarter 2012. http://www.idc.com/getdoc.jsp?containerId=prUS24029213 (accessed in December 2012)

(4) Smartphones

The smartphone market is currently dominated by Apple and especially Samsung. Together, they account for more than half of the global market share. In the fourth quarter of 2012, Samsung (South Korea) sold almost 64 million smartphones and accounted for 29% of the market. Apple (US) sold around 48 million units and had a market share of 21.8%. Huawei (China), Sony (Japan) und ZTE (China) follow at a distinct distance with 30 million smartphones sold in this period altogether and a market share each of about 4-5%.

Figure 8: Worldwide smartphone vendors, 4th quarter 2012



Source: IDC's Worldwide Mobile Phone Tracker, January 2013[31] (illustration by WEED e.V.)

While Apple and Samsung were close in terms of market share in 2012, since 2013 Samsung has become the top smartphone seller worldwide. In 2013 (third quarter), Samsung had a market share of 32%, while Apple remained with only 12%, now followed by Lenovo, LG Electronics and Huawei (all at around 5%).[32]

The smartphone market is still growing rapidly. The former biggest mobile producer Nokia (Finland) sold its mobile phones division to US software company Microsoft in September 2013 in order to concentrate on network technology (Rother 2013; Nokia 2013). Thus the largest providers on the market right now are Apple and especially Samsung, while Motorola, Ericsson, HTC, Nokia and BlackBerry have radically lost their market share in recent years (Chenn and Pfanner 2013). A new trend is the appearance of small upstarts from China, which are gaining ground with cheaper smartphones, e.g. Xiaomi (Kan 2013; Shu 2013).

31 Worldwide smartphone vendors, 4th quarter 2012. https://www.idc.com/getdoc.jsp?containerId=prUS23916413#.UQIPbh0qaSp (accessed in December 2012)
32 Gartner (November 2013), http://www.gartner.com/newsroom/id/2623415

ii. The major brands by revenue

In terms of revenue, there are several big players in the ICT sector, led by Samsung Electronics (South Korea), Apple and HP (both US). Table 3 shows a wide geographical distribution of the major brand companies producing ICT hardware. At the same time there is a concentration of major brands in Japan (9) and the US (7), followed by South Korea (4), China (3) and Taiwan (2), with single companies headquartered in European countries (1 in the Netherlands, Sweden, Finland and Germany).

Table 3: Fortune Global 500 – ICT hardware brands by revenue 2012

			2012		
	Company	**Head Office**	**Revenue (US $ million)**	**Profit (US $ million)**	**Employees**
1	Samsung Electronics	Seoul, South Korea	178,555	20,586	236,000
2	Apple	Cupertino, CA, USA	156,508	41,733	76,100
3	Hewlett-Packard	Palo Alto, CA, USA	120,357	12,650 (-)	331,800
4	Siemens	Munich, Germany	108,989	5,782	370,000
5	Hitachi	Tokyo, Japan	108,875	2,111	323,540
6	SK Holdings (incl. SK Hynix)	Seoul, South Korea	106,259	931	323,540
7	IBM	Armonk, NY, USA	104,500	16,600	466,995
8	Panasonic	Osaka, Japan	87,945	9,083 (-)	293,742
9	Sony	Tokyo, Japan	81,897	518	146,300
10	Toshiba	Tokyo, Japan	69,848	933	206,000
11	Dell	Round Rock, TX, USA	56,940	2,372	110,050
12	Intel	Santa Clara, CA, USA	53,341	11,005	105,000
13	Fujitsu	Tokyo, Japan	52,766	878 (-)	169,000
14	Cisco Systems	San Jose, CA, USA	46,061	8,041	66,639
15	LG Electronics	Seoul, South Korea	45,246	59	86,697
16	Canon	Tokyo, Japan	43,607	2,814	196,968
17	Nokia	Espoo, Finland	38,780	3,992 (-)	97,798
18	Oracle	Redwood City, CA, USA	37,121	9,981	115,000
19	NEC	Tokyo, Japan	36,989	367	102,375
20	Huawei Investment & Holding	Shenzhen, China	34,901	2,435	150,000
21	Lenovo	Beijing, China	33,873	635	35,026
22	LM Ericsson	Stockholm, Sweden	33,644	853	110,638
23	Royal Philips	Amsterdam, Netherlands	32,579	290	118,087
24	Sharp	Osaka, Japan	29,848	6,567 (-)	50,647
25	Fujifilm Holdings	Tokyo, Japan	26,670	654	80,322
26	LG Display	Seoul, South Korea	26,130	207	55,621
27	Acer	Taipei, Taiwan	14,388	1,180	7,894
28	Asus (ASUSTeK Computer Inc.)	Taipei, Taiwan	13,835	831	21,360
29	ZTE	Shenzhen, China	13,557	319	86,980

Figures for fiscal year 2012.

Sources: Fortune Global 500 (http://fortune.com/global500/2013/) and companies' annual reports

b. Contract manufacturers

Brand companies outsource close to 75% of their production to contract manufacturers (Holdcroft 2009). The largest contract manufacturers by revenue are presented here, differentiated between Electronics Manufacturing Services (EMS) and original design manufacturers (ODM).

i. Top ten EMS providers by revenue

The top ten EMS companies (by revenue, 2012) are based in Taiwan (2), Singapore (1), US (4), China (2) and Canada (1).

(1) Hon Hai Precision Industry Co. Ltd. (Foxconn)

With a revenue of US $ 132 billion (2012),[33] Taiwan-based Hon Hai Precision Industries, also known by its trading name Foxconn, is the largest EMS contract manufacturer by far. It has more than 200 different holding companies, affiliates, subsidiaries and divisions in various countries (Culpan 2013). With more than 1,1 million employees, Foxconn is also one of the biggest employers in the world (Perlin 2013: 46).

Set up in 1974 as a small company producing TV tuner knobs, Foxconn has grown so quickly that has been the largest company in Taiwan since 2005 (Chu 2009: 1061). Foxconn's China investment started in 1988 and today the company has more than 30 industrial parks and production sites in China, e.g. in Huanan, Huadong, Huazhong, Huabei, Dongbei and Xinan. Following an expansion plan of "China Rooted, Global Footprint", they set up more than 200 subsidiaries and branch offices in Asia, the Americas and Europe (Foxconn 2012: 4). Foxconn's Chinese factories tend to be more specialised than their other factories, e.g. Ipads are produced in Chengdu, iPhones in Zhengzhou (Perlin 2013: 47).

Since several Foxconn workers' suicides in 2010 became public,[34] Foxconn has become a symbol for the ICT sector's harsh attitudes towards workers. While Foxconn is mostly presented as an Apple supplier in the media, almost every major brand deals with the EMS. Companies like HP, Dell, Acer, Sony, Cisco and many more are customers of Foxconn (Kan 2012).[35] Still, Foxconn's 2012 Annual Report shows a significant share of only one customer (presumably Apple) with 57,19% of total net sales, compared with 10,22% for the next biggest customer and 32,59% for others (Foxconn 2012: 73).

(2) Flextronics International Ltd.

The second biggest EMS by revenue is Flextronics, with a 2012 revenue of US $23.6 billion. Starting in 1969 as a circuit board assembler in Silicon Valley, today it is registered in Singapore and is one of the biggest global players in contract manufacturing. From 2001 onwards, Flextronics shifted operations from higher to lower cost locations, closing down factories in North America and Europe (Van Liemt 2007: 17). Flextronics is now operating on four continents and has more than 200,000 workers. Flextronics has facilities in China, India, Malaysia, Hungary, Poland, Brazil, Mexico and the US (Flextronics 2012: 97). It operates with fully integrated industrial parks e.g. in Brazil, China and Mexico, where manufacturing and logistics operations are co-located with strategic suppliers, with third party suppliers of components located in the immediate area (Van Liemt 2007: 17).

Flextronics produces a large variety of products like smartphones, notebooks, desktop computers and tablets for Apple, as well as business telecommunications systems for Alcatel-Lucent, routers and switches for Cisco, radio base stations for Ericsson, notebooks, printers and storage devices for HP, wireless and enterprise telecommunications infrastructure and smartphones for Huawei Technologies, notebooks and desktop computers for Lenovo, consumer electronics gaming products for Microsoft, smartphones for Research in Motion and office equipment for Xerox (Flextronics 2012: 97). Ten of Flextronic's largest customers account for more than a half of its sales, and especially HP and Research in Motion (now Blackberry) accounted for more than 10% of its net sales in 2012 (Ibid).

(3) Jabil Circuit, Inc.

The third biggest contract manufacturer is US-based Jabil Circuit, headquartered in St. Petersburg in Florida. In 2012, its revenue amounted to almost US $17,2 billion.[36] Jabil Circuit has about 175,000 employees in more than 60 plants in 33 countries.[37] According to Jabil, its manufacturing factories are in China (7), the US (8), Russia (1), Ukraine (1) Mexico (3), Brazil (2), Japan (1), Vietnam (1), India (1), Malaysia (3) and in countries of the European Union (France 3, Austria 2, Italy 1, Poland 1, Scotland 1, Hungary 1, Netherlands 1).[38]

(4) New Kinpo Group

The New Kinpo Group is a large conglomerate located in Taipei, Taiwan, and was established in 1973. According to its own website, the New Kinpo Group consists of New Kinpo (including amongst others Kinpo Electronics, AcBEL, XYZ Printing, Qsan Technology, Cal-Comp Precision and EMS Cal-Comp), Compal and Vibo. According to Kinpo Group, it has "23 subsidiaries, 7 of which are publicly listed corporations, and a total of 80.000 employees".[39] The company had a joint revenue of US $6.62 billion in 2012. It has factories – partly owned by Kinpo Electronics and partly owned by Cal-Comp Electronics and Communications – in China (Dongguan, Jiangsu, Wujiang, and Guangdon), Thailand (Mahachai, Petchaburi, Ayuthaya), Malaysia (Shah Alam, Senai), Singapore, Philippines, Mexico, US, and Brazil.[40]

(5) Celestica Inc.

The EMS company Celestica is head-quarted in Toronto, Canada. In 2012, its revenue was US $6.51 billion (Celestica 2012: 4). The company has 30,000 workers and more than 20 manufacturing and design facilities in America (Canada, Mexico and US), Asia (China, Japan, South Korea, Malaysia, Singapore, Taiwan, Thailand), and Europe (Austria, Ireland, Romania, Spain, Switzerland), with a focus by numbers in the US and in China.[41]

33 For all following revenue figures, cf. Table 4
34 See for more details SACOM, "Foxconn should keep its promise; we need no fake trade unions" (including appendix on recent suicides to 2013), 30 May 2013, http://sacom.hk/statement-foxconn-should-keep-its-promise-we-need-no-fake-trade-unions/
35 See http://www.isuppli.com/Manufacturing-and-Pricing/MarketWatch/Pages/Outsourced-Manufacturing-Industry-Set-to-Enjoy-Modest-Lift-This-Year.aspx
36 See http://www.hoovers.com/company-information/cs/revenue-financial.Jabil_Circuit_Inc.4cdfa6f13c11bbb1.html
37 Jabil's website, www.jabil.com/about_us/jabil_overview; details of these plants are given for only 51 of these sites, see http://www.jabil.com/locations/
38 See http://www.jabil.com/locations/
39 See www.newkinpogroup.com/english/about_intro.html
40 See http://www.newkinpogroup.com/english/global.html
41 See www.celestica.com/worldwide/worldwide.aspx, see also order by square footage in Celestica Annual Report 2012: 35

Celestica supplies products and services to over 100 customers. These include Alcatel-Lucent, Cisco, EMC Corporation, HP, Hitachi Global Storage Technologies, Honeywell, IBM, Juniper Networks Inc., NEC, Oracle, Polycom and Raytheon Company (Celestica 2012: 30). In spite of this widespread range of customers, Celestica depends upon a relatively small number of customers for a significant portion of their revenue. In the aggregate, their most important ten customers represented 67% of revenue in 2012 and their largest customer represented 12% of the total revenue (Ibid: 25). Two of their customers, RIM and Cisco Systems, represented more than 10% of total revenue from 2012 (Ibid: 48).

(6) Sanmina

Another US-based EMS company is Sanmina-SCI with a revenue of US $6.1 billion in 2012 and approximately 44,000 employees worldwide.[42] They operate in 25 countries on six continents (Sanmina 2012: 3). Sanmina manufacturing facilities are based all over the world, but with a focus in the US, China and Mexico (Sanmina 2012: 30).

Also for Sanmina, a certain dependency on specific brands is obvious: "A relatively small number of customers have historically generated a significant portion of our net sales. Sales to our ten largest customers represented approximately 50% of our net sales for 2012, 2011 and 2010, respectively." (Ibid: 12). In 2012, French- and US-based Alcatel-Lucent represented 10% or more of the net sales, and also for 2011 and 2010 a single customer represented more than 10% of the net sales in each year (Ibid).

(7) Shenzen Kaifa Technology Co., Ltd.

Chinese EMS Shenzen Kaifa Technology Co. Ltd. was founded in 1985. It is headquartered in Shenzhen, Guangdong, China. The company's revenue is around US $2.6 billion. Its production includes advanced manufacturing and sales of components of Hard Disk Drive (HDD) and Solid State Drive (SSD) etc. As well as research & development (R&D). The company has more than 18,000 employees (2014) and branches in China, Hong Kong, Singapore, Italy, the US and Australia. By 2015, Kaifa plans to set up its four main production and R&D bases in Suzhou, Dongguan, Huizhou and Shenzhen.[43] It works with companies including Samsung, ZTE, Longcheer and Huaqin.[44]

(8) Benchmark Electronics

US-based Benchmark Electronics, founded in 1986, had a revenue of US $2.5 million in 2012[45] and around 10,000 employees, of whom more than 7,000 were engaged in manufacturing and operations.[46] Benchmark Electronics operates in Asia (China, Singapore, Malaysia, Thailand), the US, Canada and Mexico, and in Europe (Romania and the Netherlands).[47] In its 2012 Annual Report, the company explicitly states that "None of our domestic employees are represented by a labour union" (Benchmark 2012: 15).

42 See http://www.hoovers.com/company-information/cs/revenue-financial.Sanmina_Corporation.9623bce45c7875ce.html
43 Company's website, http://www.kaifa.cn/en/about/index.aspx?menuid=1201&firstno=12
44 Company's website, http://www.kaifa.cn/en/yewu/dianzi.aspx?menuid=140101
45 Benchmark Electronics (2012: 2)
46 See http://www.hoovers.com/company-information/cs/revenue-financial.Benchmark_Electronics_Inc.98a5ebcd19e6c7fe.html and Annual Report 2012, p. 15
47 http://www.bench.com/WorldwideLocations/Pages/Overview.aspx; for facilities sorted by square meters see Annual Report 2012, p. 21

With regard to their customers, Benchmark states that "a substantial percentage of our sales have been made to a small number of customers. Sales to our ten largest customers represented 56%, 53% and 47% of our sales in 2012, 2011 and 2010, respectively. In 2012, sales to International Business Machines Corporation represented 21% of our sales" (Ibid: 13).

(9) Plexus Corp.

US-based Plexus was established in 1979 and offers EMS services in the four main markets: networking/communications, healthcare, industrial products and security/aerospace (Plexus 2012: 2). Plexus had a revenue of US $2.3 billion in 2012. The company's approximately 140 customers in 2012 are both large multinational companies and smaller emerging technology companies (Ibid: 7). According to market researcher Hoover, it garners about half of its sales from US customers and a third from Malaysia.[48] It has manufacturing facilities in Malaysia (4), China (3), Europe (3: Scotland, England and Romania), Mexico (2) and the US (6).[49]

(10) Universal Scientific Industrial, Inc. (USI)

Universal Scientific Industrial was established in 1976 as a component supplier, but transformed into an EMS provider in 1988.[50] Today, it describes itself as a 'DMS'-company, which stands for ODM and EMS.[51] The company is situated in Taiwan and has around 60,000 employees.[52] In 2012, it had a revenue of US $2.15 billion. Its manufacturing sites are situated in Taiwan (2), China (3) and Mexico (1).[53] Since 2010 USI is owned by the ASE Group (Advanced).[54]

ii. Top ten ODM providers by revenue

(1) Quanta Computer Inc.

Quanta Computer is a Taiwan-based company, which was founded in 1988.[55] In 2012 its revenue was around US $34.4 billion.[56] With its 121,917 employees (2012), it produces mainly notebooks as well as various other products such as personal computers, netbooks, network servers, smartphones, handhelds, automotive electronics, television set-top boxes, monitors, LCD TVs, data storage products (via Quanta Storage), and personal navigation devices as well as other GPS products (via RoyalTek company). Its customers include brand companies such as Dell, Apple and HP.[57] It has operation centres across Asia, America and Europe.[58]

(2) Pegatron Corp.

Taiwan-based Pegatron was founded in 2007 as a spinoff from Asus. In 2012, the company had 177,948 employees and its subsidiaries had another 112,318 (Pegatron 2012: 106). Pegatron had a revenue of US $29.8 billion in 2012. The company

48 http://www.hoovers.com/company-information/cs/revenue-financial.Plexus_Corp.8a1f29244cc1ab3b.html
49 See Plexus-website, www.plexus.com/global-locations/all-locations; for order by square meters see Annual Report 2012, p. 20
50 See www.usi.com.tw/history. html
51 See www.usi.com.tw/overview.html
52 See http://investing.businessweek.com/research/stocks/private/snapshot.asp?privcapId=36046
53 See www.usi.com.tw/global.html
54 See http://www.aseglobal.com/en/About/StructureOrganization.asp
55 See http://www.quantatw.com/Quanta/english/about/company.aspx
56 See Table 4 for all ODM revenue figures.
57 See http://www.hoovers.com/company-information/cs/company-profile.Quanta_Computer_Inc.b031066122cd3ed9.html
58 See http://www.quantatw.com/Quanta/english/about/company.aspx

produces motherboards, desktop PCs, notebooks, broadband, wireless systems, game consoles, networking equipment, set-top boxes, multimedia, LCD TVs and more.[59] Pegatron's customers include Microsoft, Dell, HP and Apple (Sawall 2013). Its operation sites are based in Asia (Suzhou, Shanghai and Chongquing in China; Taipei and Taoyuan in Taiwan; Tokyo in Japan), Europe (Ostrava in the Czech Republic) as well as South and North America (São Paulo in Brazil, Juarez in Mexico, and Indiana in the US).[60]

(3) Compal Electronics Inc.

Compal Electronics, founded in 1984, is based in Taiwan.[61] With its 67,156 employees (2012),[62] it primarily produces notebook computers, but also computer monitors, LCD TVs, portable and handheld consumer electronics, and other devices.[63] Compal Electronics' revenue in 2012 was almost US $22,9 billion. Its customers include HP,[64] Dell,[65] Acer, NEC, Nokia, Invent and Lenovo. It has manufacturing facilities in Asia (China in Chengdu, Shanghai and ChongQuing; Vietnam) and South America (Brazil and Mexico), as well as service centres in Europe and the US.[66]

(4) Wistron Corp.

Wistron was founded in 2001 in Taiwan[67] (as a spin-off of Acer, see Manhart/ Grießhammer 2006a: 26). In 2012 the company had a revenue of US $20 billion. With around 60,000 employees (2012), Wistron provides design, manufacturing and after-sales support services for notebook PCs, desktop systems, server and storage systems, IA (information appliances), handheld devices, networking, and communication products. Its offices and operations cover Asia, North America and Europe (Wistron 2012: 8).

(5) Inventec Corp.

Inventec was established in 1975.[68] It had a revenue of US $10.7 billion in 2012, producing notebooks and desktop computers, but also designs and produces calculators, smartphones, modems and portable computing and media devices. It has subsidiaries in locations including Hong Kong, North America, Japan and the Czech Republic.[69] Its customers include Acer, Apple, Toshiba and HP – the latter accounting for 60% of its notebook shipments,[70] which are produced in China.[71] Further manufacturing sites are in the US, Mexico, the UK, the Czech Republic, China and Taiwan.[72]

(6) Cal-Comp Electronics (Thailand) PCL

Cal-Comp Electronics is a Thai-based company, founded in 1989, which is controlled by New Kinpo Group.[73] With its 16,937 employees (2012), Cal-Comp produces

59 See http://pegatroncorp.com/company/whoWeAre.php
60 See http://www.pegatroncorp.com/company/businessOperation.php
61 See http://www.bloomberg.com/quote/2324:TT
62 See http://www.crmz.com/XMLGateway/NewsFeedXML.asp?BusinessId=5492788
63 See http://www.compal.com/CompalContent.aspx?MenuID=aboutcompal&MenuItemNo=6
64 HP supplier list 2013, http://h20195.www2.hp.com/V2/GetPDF.aspx/c03728062.pdf
65 Dell supplier list 2013, http://www.dell.com/learn/us/en/uscorp1/corp-comm/cr-ca-list-suppliers?c=us&l=en&s=corp
66 See http://www.compal.com/CompalContent.aspx?MenuID=aboutcompal&MenuItemNo=8; http://www.compal.com/index.php/en/about-compal/global-operation
67 See http://www.wistron.com/about/company_profile.htm
68 See http://www.bloomberg.com/quote/2356:TT
69 See http://www.inventec.com/english/about/about_content_f01.htm
70 See http://www.hoovers.com/company-information/cs/company-profile.Inventec_Corporation.a866cdc1b5c64898.html
71 HP Website, supplier list 2013, http://h20195.www2.hp.com/V2/GetPDF.aspx/c03728062.pdf
72 See http://www.inventec.com/english/about/about_content_c01.htm
73 See http://taipei.calcomp.co.th/english/about_intro.html and see further information on New Kinpo Group above.

computer peripherals such as ink-jet printers, multi-function printers, dot-matrix printers, external HDD, printed circuit board assembly for HDD, telecommunication products such as set-top boxes, mobile phones and Bluetooth headsets. Its clients include Western Digital, Seagate, Advance Digital Broadcast, HP, Panasonic, Motorola and Nikon. Its factories are mainly based in China and Thailand, with smaller facilities in Taiwan, Malaysia, Brazil, Mexico, US, Singapore and the Philippines.[74]

(7) Lite-On IT Corp.

Lite-On IT was formerly a subsidiary of the Taiwanese Lite-On Technology Corp, but in 2014 it was acquired completely by the mother company.[75] With its 35,000 employees,[76] it produces optical storage, consumer electronics, automotive entertainment electronics and other markets.[77] In 2012 it had a revenue of US $4.1 billion. Its production locations are mainly in China, but are also found in Brazil, Finland, Japan, India, Korea, Taiwan, Sweden and Singapore.[78]

(8) Qisda Corp.

Qisda, based in Taiwan, was founded in 1984.[79] It has about 8,000 employees and produces LCD monitors, all-in-one PCs, digital signage and professional displays, projectors, scanners, multifunctional printers, 3G/4G smartphones, medical gateways, medical imaging and telecare, automobile infotainment devices, e-Readers, digital photo frames/albums, eNote/tablet and media routers. Its revenue in 2012 amounted to US $2.8 billion. Qisda has R&D centres located in Taiwan and China, and global manufacturing sites in China, Mexico and Taiwan.[80]

(9) Compal Communications Inc.

Compal Communications, based in Taiwan, was founded in 1999.[81] It was acquired by Compal Electronics (see above) and is now their subsidiary. With its 5,000 employees (Compal CSR Report 2012: 7), it manufactures mobile phones, tablets and other products.[82]

(10) Arima Communications Corp.

Arima Communications, based in Taiwan, was founded in 1999.[83] With its 4,459 employees (2012),[84] it manufactures mobile communications products such as multi-band global systems for mobile communication (GSM)/ general packet radio service (GPRS),[85] 3G mobile phones and smartphones. Its revenue in 2012 amounted to US$ 697 million. It has manufacturing sites in Mexico, Brazil, China and Taiwan, and R&D centres in China and Taiwan.[86]

74 See http://taipei.calcomp.co.th/english/about_profile.html
75 See http://www.reuters.com/finance/stocks/2301.TW/key-developments/article/2751139; http://www.liteonit.com/aboutus.html
76 See http://www.liteonit.eu/en/company-profile
77 See http://www.hoovers.com/company-information/cs/sales-preparation.LITE-ON_IT_CORPORATION.cd079e90060ad837.html
78 See http://www.liteonmobile.com/eng/contact-us/locations
79 See http://www.bloomberg.com/quote/2352:TT
80 See http://qisda.com/page.aspx?uid=7
81 See http://www.bloomberg.com/quote/8078:TT
82 See http://www.compalcomm.com/OWS/Content.aspx?UID=45D31433869C4CFF
83 See http://www.bloomberg.com/quote/8101:TT; http://www.arimacomm.com.tw/english/Milestone.asp
84 See http://www.hoovers.com/company-information/cs/sales-preparation.ARIMA_COMMUNICATIONS_CORP.631bfc4a0e5a3c19.html
85 See http://en.wikipedia.org/wiki/General_Packet_Radio_Service
86 See http://www.arimacomm.com.tw/english/about01.html

iii. Aggregated ranking of contract manufacturers by revenue

Table 4: Fortune Global 500 - contract manufactures ICT hardware Ranking by revenue (2012)

			2012		
	Contract manufacturers	**Head office**	**Revenue (US $ million)**	**Profit (US $ million)**	**Employees**
1	**Hon Hai Precision Industry (Foxconn)**	New Taipei, Taiwan	132,076	3,205	1,290,000
2	**Quanta Computer**	Kuei Shan Hsiang, Taiwan	34,412	779	121,917
3	**Pegatron**	Taipei, Taiwan	29,825	206	177,948
4	**Flextronics International**	Singapore	23,610	277	149,000
5	**Compal Electronics**	Taipei, Taiwan	22,870	241	43,000
6	**Wistron**	Taipei, Taiwan	20,052	824	60,000
7	**Jabil**	St. Petersburg, FL, USA	17,152	-	121,000
8	**Inventec**	Taipei, Taiwan	10,723	469	3,729
9	**New Kinpo Group**	Taipei, Taiwan	6,620	-	80,000
10	**Celestica**	Toronto, Canada	6,507	438	29,000
11	**Sanmina**	San Jose, CA, USA	6,093	-	43,000
12	**Lite-On IT**	Taipei, Taiwan	4,069	252	35,000
13	**Qisda**	Taoyuan, Taiwan	2,829	-	8,000
14	**Shenzhen Kaifa Technology**	Shenzhen, China	2,635	9	-
15	**Benchmark Electronics**	Angleton, TX, USA	2,500	177	10,000-
16	**Plexus**	Neenah, WI, USA	2,306	220	-
17	**Universal Scientific Industrial**	Shanghai, China	2,147	-	60,000
18	**Arima Communications**	Taipei, Taiwan	697	-	4,459

Figures for fiscal year 2012.
Sources: Fortune Global 500 (http://fortune.com/global500/2013/) and companies' annual reports

iv. Manufacturing facilities of contract manufacturers

Table 5 shows the countries where these contract manufacturers operation: China (94), the US (47), Mexico (25), Brazil (16), Malaysia (15) and Singapore (13) are the main locations for the above-mentioned top contract manufacturers' manufacturing sites.

Table 5: Major ICT contract manufacturers – manufacturing plants (according to companies' publications, May 2013)

		China		Taiwan												US				Canada	Singapore
		Universal Sci-entific Industrial Co. Ltd.	Shenzhen Kai-fa Tech-nology Co. Ltd.	Foxconn/Honhai	New Kinpo Group: Kinpo Electronics, Inc.	New Kinpo Group: CalCompElectronics&CommunicationsCo., Ltd.	Acbel Polytech Inc.	Quanta Computer	Pegatron	Compal	Wistron	Inventec	Lite-On Technology Corporation: Lite-On Mobile	Lite-On Technology Corporation: Optoelectronics	Qisda	Arima Communications	Jabil	Sanmina Corporation	Benchmark Electronics	Plexus	Celestica	Flextronics
Aisa	China	3	3	28	2	3	1	3	3	4	4	3	6	2	1	1	7	5	1	2	4	8
	Taiwan	1		1	1				1	2	1	1	1		1	3						
	India			1									1				1	1				4
	Indonesia																	1				1
	Malaysia			1		2					1						1	1	1	1	4	3
	Philippines					1	2															
	Singapore		1	1		1							1				4	3			2	
	Sri Lanka																		1			
	Thailand				1	3								1				1	1		1	
	Vietnam			1						1							1					
	Japan			2									1								1	2
	South Korea			2									2									
Americas excl. USA	Brazil			5		1				1			1			1	2	1	1			3
	Mexico	1		6		1			1		1				1	1	3	2	2	1	1	4
	Argentina			1																		
East Europe and Russia	Hungary			1													1	2				5
	Poland								1								1					1
	Slovakia			1																		
	Russia			1																		
	Czech Republic			1				1		1	1											
	Ukraine			1													1					2
	Romania																		1	1		
Western Europe and North America	Canada																					4
	UK			1							1						1	1		2		
	Germany																	1				
	Ireland																				1	2
	Spain																				1	
	Turkey																					
	US			5				1	3		2						5	4	3	5	4	15
	Puerto Rico																					
	Netherlands			1													1					
	France																2					
	Austria																1					1
	Italy																					3
	Sweden																	1				2
	Finland																	1				
Others	Israel																	2				4
	Turkey			1																		
	Australia			1																		

Source: Information by companies (especially annual reports). The data of the detailed location and contact details of the manufacturing sites are available at WEED e.V. (please contact weed@weed-online.org)

IV. Country-based mapping

1. Top countries by ICT exports

The top electronics exporting country in 2012 is China by a substantial margin, as Table 6 shows. China is followed by Singapore, Japan, Taiwan and Malaysia with similar figures. In turn, they are closely followed by South Korea and Mexico. Smaller figures are to be found in Thailand, Vietnam, Philippines as well as Indonesia, India, finishing up with Sri Lanka with an export value of US $211,239 million in 2012.

Table 6: Exports of electronics in 2012 by country

Category/ Countries	Country's own figures, based on SITC[87]	Country's own classification[88]	SITC (75-77)[89]	HS (84-85)[90]
China			US $ 697,656.97 million	
Singapore	US $ 153,270.40 million[91]		US $ 137,469.30 million	
Japan			US $ 137,425.44 million	Yen 9,358,226.52 million
Taiwan				US $ 136,980.81 million-$
Malaysia	RM 231,225.40 million[92]		US $ 132,822.69 million	
South Korea	US $ 128,519.54 million[93]		US $ 94,838.72 million	
Mexico			US $ 95,624.21 million	
Thailand		US $ 44,534.46 million[94]	US $ 48,602.98 million	
Vietnam		US $ 36,235.09 million[95]		
Philippines		US $ 21,951.31 million[96]		US $ 27,826.49 million
Indonesia			US $ 13,173.06 million	
Indien			US $ 10,174.17 million	
Brazil			US $ 3,657.21 million	
Sri Lanka			US $ 211.24 million	US $ 296.36 million

Sources: UN Comtrade http://comtrade.un.org/db/ (as of July 2013), completed by information from countries when necessary (see footnotes).

87 Countries state their figures are based on Standard International Trade Classification (SITC), but do not clarify which categories they have included.
88 Numbers based on own classification by the country, not defined which products are included
89 SITC: Classification system for international merchandise trade statistics by the United Nations Statistical Commission. Category 75: Office machines and automatic data-processing machines. 76: Telecommunications and sound-recording and reproducing apparatus and equipment. 77: Electrical machinery, apparatus and appliances, n.e.s., and electrical parts thereof (including non-electrical counterparts, n.e.s., of electrical household-type equipment). Source: http://unstats.un.org/unsd/cr/registry/regcst.asp?Cl=28
90 Harmonized Commodity Description and Coding System (HS). Multipurpose international product nomenclature developed by the World Customs Organization (WCO). Section XVI: Machinery and Mechanical Appliances; Electrical Equipment; Parts Thereof; Sound Recorders and Reproducers, Television Image and Sound Recorders and Reproducers, and Parts and Accessories of Such Articles. Including: Chapter 84: Nuclear reactors, boilers, machinery and mechanical appliances, data processing machines. Chapter 85: Electrical machinery and equipment and parts thereof; sound recorders and reproducers, television image and sound recorders and reproducers, and parts and accessories of such articles. Source: http://www.wcoomd.org/en/topics/nomenclature/instrument-and-tools/hs_nomenclature_2012/hs_nomenclature_table_2012.aspx
91 See http://www.singstat.gov.sg/publications/publications_and_papers/reference/mdscontent.html#external_trade
92 See http://www.matrade.gov.my/en/component/joomdoc/doc_download/1404-trade-performance-2012
93 See http://global.kita.net/ (based on SITC 75-77).
94 See http://www.bot.or.th/English/Statistics/EconomicAndFinancial/ExternalSector/Pages/StatInternationalTrade.aspx; total Value and Quantity of Exports Classified by Product Group (US$), categories: Electronics + Electrical Appliances
95 See http://www.customs.gov.vn/English/Document%20Library/Customs%20Statistic%20Data/2012/2012-T12T-2X%28EN-FL%29.pdf
96 See http://www.dti.gov.ph/uploads/DownloadableForms/Phl%20Exports%20to%20the%20World%20FY%202012.pdf (accessed in December 2012).

When analysing export figures, the following should be taken into account: on the one hand, export numbers may be incomplete or inaccurate, since a lot of countries produce for their domestic markets and many produce components, but deliver them within the cluster in the same country; on the other hand, countries may export a small electronics component and re-import the assembled larger component.

In 2011, market analysts predicted that "countries of Southeast Asia are becoming more important producers of goods and commodities, both for export and for their own increasingly prosperous consumers. Established manufacturing countries such as Thailand aspire to compete globally, while low-cost producers such as Vietnam and Cambodia seek to lure business away from more expensive areas in China".[97]

2. Country portraits

What lies behind these statistics? The following country portraits contain short facts and figures about these countries' ICT production and highlights the key labour issues in each country.

a. China

Facts and figures

China has a central position as major production location for the electronics industry. In 2010, the export volume of IT products in China stood at US $534.8 billion (Lüthje et al 2013a: 138). In 2012, exports stood at US $697.6 billion.[98] In 2006, more than 85% of all notebooks were manufactured in the greater Shanghai area (New Earth/Sustainability Consortium 2012: 11). The largest subgroups produced in China 2010 were communication electronics, computers, electronic components and components for electronic devices (Lüthje et al 2013a: 139).

There is a clear focus on assembly and components manufacturing, and China has the role as a "global assembly hub" (Ibid: 138). Accordingly, China's import of IT components is very high: US $377 billion, which accounts for 30% of the country's total imports (Ibid: 2010 figures).

Until now, the ICT industry in China has mostly produced for international markets, although the domestic market has rapidly gained in importance (Ibid: 135). Also, 72.5% of revenue is held by foreign investors or overseas Chinese companies from Taiwan, Hong Kong or South East Asia, which gives a strong position to non-Chinese capital in the IT sector (Ibid: 139). More specifically, there are the following kinds of companies: foreign multinational companies like Samsung, Nokia, IBM and Intel; overseas Chinese companies from Taiwan, Hong Kong or South East Asia like Foxconn (contract manufacturer), ECS (component supplier), AU Optronics (chip foundry) and TSMC, Mediatek and ASE (development and assembly companies); Chinese state-owned enterprises and hybrid enterprises, i.e. state-owned hybrids with capital from international financial markets via Hong Kong such as Lenovo, Huawei, ZTE, TCL and SMIC; and finally Chinese private companies, mostly small- and medium-sized, including successful start-ups like Celestial Semiconductor and Techfaith (chip and software design) (Ibid: 140-141).

97 PricewaterhouseCoopers Co., Ltd., Southeast Asia's Next Step, 2011, cf. http://www.pwc.com/jp/ja/japan-knowledge/archive/assets/pdf/archive_se_asia_report_en.pdf
98 See Table 6.

Today, the largest location for export-oriented ICT manufacturing is the Pearl River Delta in the South of China. This includes Guangdong Province with the highest share of revenues from ICT manufacturing (31,6%). Guangdong is dominated by the assembly of electronics components and large-scale contract manufacturing, mostly by Hong Kong- and Taiwan-owned companies. Other important locations are Jiangsu (23,7% revenue) with many Taiwanese contract manufacturers and Shandong (7,6%) at the East coast or Shanghai (10,2%) in the Yangtze River Delta, which is dominated by multinational brand companies (Ibid).

Recent investments by the largest contract manufacturer Foxconn reveal an increasing trend to move away from China due to rising labour costs. Plans were announced that Foxconn wants to invest US $1 billion in a new production line in Indonesia (Handrahan 2012). Foxconn is also expanding out of China to other countries like Brazil, where they are building their fifth plant (Luk 2012). Foxconn also established a manufacturing base in Northern Vietnam in 2010 and presently operates five facilities in Bac Giang and Bac Ninh provinces. Still, these factories are near the border of Southern China, close to the cluster in Guangdong, and create a production network with the Foxconn factories in Shenzhen (Kameny 2013).

China itself has become the largest demand market worldwide and is characterised by a growing demand for electronics products. While the Chinese factories in the past mainly supplied Western countries, this picture has changed recently. Thus in terms of local demand, it is likely that Chinese companies will keep production capacity within reach.

The minimum wage in China is much lower in the interior regions of China, like Chongqing, compared with wages along the coast, like Shenzhen (Kameny 2013). Currently rising wages in China, especially in the coastal regions, have led to more than 10% higher work costs per annum (Sodhi/Tang 2012: 4; Worstall 2012). This has led to an increased settling of production facilities in interior China. Thus there is a trend to move away from the large, established clusters in the Pearl River Delta Guangdong (e.g. Shenzen), Jiangsu Province around Shanghai and Shangdong towards new production sites in Western and Central China, such as in Sichuan, Chongqing, Chengdu or Henan (Lüthje et al 2013a: 141; Kameny 2013).

Foxconn, HP, Quanta Computer and Inventec all now have production facilities in Chongqing (Sung 2012). However, unlike several assembly factories, component suppliers – especially in the semiconductor fabrication – have not moved their facilities to inner China to the same degree. Reasons may be both the reasonable fear for rising wages in inland China as well as China's five-year plan including a new economic model with increased wages (see below). A concern for all of China is the water shortage in some of these areas in North and West China (Hoekstra/Mekonnen 2011), which has a direct impact on the water-dependent semiconductor manufacturing, and costs of building new factories.

Labour issues

China has strong labour laws in place, in theory. However, in practice social rights are often not implemented. China's Labour Contract Law was implemented in 2008 and was revised in 2013 with the aim of preventing the exploitation of agency workers, but observers query essential changes (China Labor Bulletin

(CLB) 2013). Agency workers are usually paid less than regular employees, they have fewer benefits and less job security. Other labour issues in China include the exploitation of student workers as regular workers, discrimination, excessive working hours, low wages and the prevention of collective bargaining.

Trade unions in China traditionally do not perceive themselves as representing the workers, but as mediators in favour of a smooth production flow (Traub-Merz 2011: 5-6). Collective bargaining is not allowed. As a reaction to an increasing number of legal cases, the government released "Regulations on Consultation and Mediation for Labour Disputes in Enterprises" in 2012, with the mandate to create labour dispute mediation committees in all large-scale enterprises (CLB 2011).

The All-China Federation of Trade Unions (ACFTU) is deeply intertwined with China's government and the Communist Party. ACFTU exercises a legal and heavily protected monopoly over all subsidiary union organisations and trade union activities (Van Dijk/Schipper 2007b: 29). An interesting new trend, however, is to be observed in Guangdong Province, where the local government has released a draft Directive on Democratic Management. This stipulates for the first time democratic elections of factory trade unions, bargaining rights for workers and a more significant role for trade unions in bargaining at the local and provincial levels (Lüthje et al 2013a: 341; Traub-Merz 2011: 8).

It has to be noted that workforce and labour rights issues differ tremendously, both between large numbers of low-wage mass workers in manufacturing, including many internal migrant workers, and well-paid employees in the technical, engineering and service professions (Lüthje et al 2013a: 135). They also differ according to different production models (Lüthje et al 2013a: 156 ff., with detailed examples in several case studies).

In developing its twelfth five-year-plan (2011-2015), the Chinese government has proclaimed a change in the Chinese economic approach from the previous accumulation model with high export surplus and massive state-run capital investments in infrastructure, turning increased attention on the domestic market, including increasing wages to strengthen consuming power (Traub-Merz 2011: 2).

At the same time, China is characterised by a shortage of labour, which is mainly due to the rapid aging of the Chinese population, the peak of which is not expected to be until 2025/30 (Traub-Merz 2011: 4). This has some influence on the levels of power, as it becomes more and more difficult for contract manufacturers and suppliers to recruit and retain employees.

Companies in China, especially in the export zones, have been faced with an increasing number of strikes. These were not organised by trade unions, but by unorganised migrant workers, as many of the second generation of migrant workers do not accept exploitation and poor wage policies anymore (Traub-Merz 2011: 2).

b. Singapore

Facts and figures

In the 1960s and 1970s, the electronics industry in Singapore started as an assembly site for TVs (Singapore EID: 8). In 2012, Singapore exported electronics worth US $153,270 million.[99] 80,000 workers are employed in the sector, which represents 19% of total employment in the manufacturing sector (BusinessVibes 2013).

Singapore serves as the headquarters of several ICT companies, as well as of assembling and manufacturing sites. Intellectual property law and patent law in Singapore is one of the most protective in Asia and companies are close to their supply chain due to its geographical position and the seaport of Singapore (Economy Watch 2010; EID 2013: 5). Flextronics, Chartered Semiconductor Manufacturing and Hyflux are just some of the companies that set up headquarters in Singapore.

The electronics sector contributes 4% to Singapore's gross domestic product (GDP). The production units include 14 silicon wafer fabrication plants, 40 chip design centres and 20 plants for assembling and testing products. The semiconductor sector is the largest in Singapore's electronics industry; it generates US $39 billion in manufacturing output (Singapore EID 2013: 9).

Companies that manufacture printing and data storage devices, batteries, chips and almost every other component related to the industry can be found in Singapore. Semiconductor companies like Avago[100] have a particularly high presence.

Labour issues

Even though the right of freedom of association is guaranteed in Singapore's constitution, only 16% of workers in the industry are trade union members (US Department of Labor (DOL) 2012: 3-4).

In the Employment Act of Singapore, it is stated that workers are not allowed to work more than 44 hours a week, that they do not have to work more than eight hours a day (overtime is optional) and they must have one day off per week. Still, there are several exceptions to this law that allow companies to allow their employees to work more than that, especially when they are shift workers (Ibid: 17).

According to the Factories Act, employees are allowed to refuse to work at a dangerous workplace. However, if an investigation comes to another conclusion about the risk and danger, the employee does not have a right of further employment (Ibid: 18).

No minimum wage is guaranteed by law (Ibid: 16).

Singapore is one of the few states in the world that did not ratify the International Labour Organization Convention (ILO) Nr. 189, which guarantees decent working conditions for migrant workers (HRW 2012: 4). It is estimated that 600,000 people working for the electronics industry in Singapore are migrant workers.

99 See Table 6.
100 Avago Technologies Ltd. is a Singaporean company with headquarters in California and Singapore, designing and developing products including semiconductors and custom chips; see www.avagotech.com

This represents about 30% of the total workforce. Workers come from all over Southeast Asia, e.g. China, Philippines, Thailand and elsewhere. They only get about 14% of the wage of their Singaporean colleagues and are usually not subject to Singaporean law (US DOL 2012: 19).

c. Japan

Facts and figures

In the past, Japanese brands for consumer electronics like Sony, Panasonic and Sharp dominated the market for TVs, radios and Japan also dominated the global computer chip industry in the 1980s, as it produced more than half of the world's semiconductors. The former success of Japanese companies, both in consumer electronics and semiconductors, was based on 'the vertically integrated' model, producing everything from the parts and components to the final products in-house. However, the Japanese industry has now been outperformed by South Korea, China and the US (Hays 2009). Japan's economy has been in long-term stagnation after the collapse of the bubble economy in 1991. Between 1991 and 2011, the number of business establishments decreased by half and the number of employees (in regular employment) decreased by two-thirds. Reasons for this decline have been the shift of production overseas and the greater competitiveness of manufacturers in Korea and China (Haruhi/Kaneko 2013: 221).[101]

Rather than consumer products, Sony and Sharp now supply components to other companies, like cameras (Sony) for iPhones or displays (Sharp) for smartphones (Chaeng 2012). Today, electronic components and devices make up the biggest proportion of Japanese exports. They accounted for 7,129,904 million yen in 2013 compared to 649,314 million yen for consumer electronic equipment and 1,330,259 million yen for industrial electronic equipment (Jeita 2013). Two of the world's top ten semiconductor manufacturers are Japanese: Toshiba and Renesas Electronics Corporation (Gartner 2013a). With an export of US $137,425 million in 2012[102], Japan is still one of the biggest players in the electronics industry. Consumer electronics account for a third of Japan's economic output (Hays 2009).

Labour issues

In Japan, the collapse of the bubble economy in 1991, the competing electronic companies from Taiwan and South Korea and the financial crisis have all made their mark. This has led to massive factory closures and massive cuts of the workforce. Non-regular employees were the first to be laid off, followed by regular employees (Haruhi/Fumio 2013: 222). Many people were dismissed, as part of the so-called 'expulsion room' (oidashi-beya), which was first featured on the front page of the Asahi Shimbun in December 2012. According to the report, employees whom the company wanted to retire and who did not accept voluntary retirement were gathered in an 'expulsion room' and left without any assignment or assigned chores or piecemeal work. Thus, they were indirectly encouraged to resign (Ibid: 256).

A linked problem is the growing number of employees in irregular employment (Friedrich Ebert Stiftung (FES) 2011: 1), which now amounts to more than 30% of the workforce (Daimon 2012: 2). The effect is that more and more people are excluded

101 See for a more detailed analysis: José Gabriel Palma, "Flying geese and waddling ducks: the different capabilities of East Asia and Latin America to "demand-adapt" and "supply-upgrade" their export productive capacity.", http://unctad.org/sections/gds_ecidc/docs/gds_ecidc_2010d07Palma_en.pdf

102 See Table 6

from social security systems, as they are not able to pay the fees. This goes back to the revision of the Worker Dispatch Law in 2004, allowing companies to dispatch workers to manufacturing plants (Haruhi/Fumio 2013: 288).

Laws on trade unions in Japan guarantee the right of association, to conclude collective agreements and the right to strike (Daimon 2012: 2). Still, compared to European trade unions, Japan's trade unions are rather weak and have few members. Furthermore, the Japanese Federation of Trade Unions, RENGO, only represents regular workers (FES 2011: 1).

d. Taiwan

Facts and figures

Taiwan's main export products are electronics, followed by mineral products, opto-electronics, plastics, chemicals and machinery (German Trade Office (GTO) 2013a). In 2012, the electronics export amounted to almost US $137 billions.[103] Electronics represent the main export product in Taiwan (GTO 2013b).

The electronics industry started in Taiwan in the late 1960s. Then it was mostly characterised by foreign US investors and local component suppliers. However, with the consolidation of vertical specialisation in the ICT industry, contract manufacturing grew in Taiwan, starting with large contract manufacturers for microchips. Today, these are the most sophisticated semiconductor companies (Lüthje et al 2013b: 107-108). This was supported by the Taiwanese government, e.g. by subsidising the Hsinchu Science and Industrial Park (HIS) in the North-West in the 1980s as a low-tax area. Many Original Design Manufacturers (ODM) and assemblers used these advantages to set up their factories here (Thomas White International (TWI) 2011: 5). Other industry parks involving electronics are the Central Taiwan Science Park near Taichung, the Southern Taiwan Science Park, including Tainan Science Park, and Kaohsiung Science Park.

When labour costs grew in Taiwan, Taiwanese contract manufacturers shifted large volumes of production to mainland China. After 2005, the great majority of facilities belonging to major Taiwanese contract manufacturers were located on the mainland, while design and logistics are managed at the Taiwanese headquarters (Lüthje et al 2013b: 107-108). However, 450 companies are still situated at the HIS and contribute US $30 billion every year, which is up to 3% of Taiwan's GDP (TWI 2011: 5).

Today, Taiwan is the third major hub of contract manufacturing in Asia. It is the centre of the world's leading EMS contract manufacturers and location of several ODM contract manufacturers as well (Lüthje et al 2013b: 107-108). Taiwanese companies control more than 90% of final design and manufacturing of PCs sold worldwide (Bradsher 2013). According to the German Trade Office in Taipei, 98% of all motherboards and 93.3% of the notebook PCs worldwide are manufactured in Taiwan (GTO 2013c).

Most of the biggest contract manufacturers are headquartered in Taiwan (e.g. Foxconn/Honhai, New Kinpo Group, Quanta Computer, Pegatron, Compal, Wistron, Inventec, Lite-On Technology Corporation, Qisda and Arima Communications).

103 See Table 6

Labour issues

Taiwanese workers face very long working hours. In 2011, some workers protested in Taipei against Article 84-1 of the Labour Standard Law. This states that, in some fields, working conditions can be established by employers, thus exceeding maximum working hours and changing holiday and overtime regulations. In many contracts a so-called job responsibility system can be found, which means that overtime hours are not being paid to the workers (I-chia 2011).

Trade unions exist in Taiwan, but employers try to prevent their workers from forming them. Further problems include: insufficient health protections; low wages for some worker groups; poor working conditions and contracts for migrant workers; as well as hiring of students as 'interns', who are sometimes under the Taiwanese minimum working age of 16 (Gardner 2010).

e. Malaysia

Facts and figures

While Malaysia was a producer of raw materials in the 1970s, it is now a multi-sector economy packed with technology, knowledge and capital.

Malaysia is located in the middle of the ASEAN states and therefore attracts many foreign investors. Furthermore, the government in Malaysia has been promoting labour-intensive and export-oriented industries for years. Most of Malaysian goods are exported to Asian states (Singapore 13%, China 13%, Japan 11%, Thailand and Hong Kong 5%) and 10% are exported to the US. Of all exports, electronics hold a 34.5% market share (Malaysian-German Chamber of Commerce (MGCC) 2012: 1-4). In 2012, Malaysia exported electronic goods worth US $132,822.69 million. According to the Malaysian Investment Development Authority (MIDA), the electrical and electronics sector is the country's biggest manufacturing sector (MIDA 2013).

Many Japanese and Korean companies are active in Malaysia in the area of consumer electronics. The electronics components business makes up a large proportion of activity in the sector. This sub-sector is responsible for 36% of investments in the electronics industry. Semiconductor manufacturing (as part of the electronics components business) contributes the most to the Malaysian electronics industry. In most factories parts are assembled and tested (Ibid). The largest production centres in Malaysia are located in the west of the main island, especially in Pulau Pinang, Kuala Lumpur and Johor Bahru.

More than 50 of the global EMS companies are located in Malaysia, amongst them Flextronics (including Solectron), Celestica, Jabil, Plexus, and Sanmina (MGCC 2012: 4). The largest Malaysian companies in the electronics industry are Malaysian Pacific Industries, Hong Leong Industries, Panasonic Manufacturing Malaysia, Unisern and ETI Tech Corporation (Ibid: 5).

Labour issues

Electronics production in Malaysia is connected with low wages, long working hours and non-compliance with internationally accepted standards of collective bargaining and trade unions rights (Lüthje et al 2013b: 170). There is discrimination both gender-wise and against migrants.

One of the major labour issues in Malaysia is the employment of migrant workers from Indonesia, Myanmar, Nepal, etc. Often, migrant workers are already in debt when they start to work in an electronics factory as the employers or agencies demand high fees for the recruitment of workers. Furthermore, they are paid less than regular workers, work up to 72 hours per week (overtime is often not paid) and sometimes do not even get a contract at all.

Agencies withhold workers' passports after they have been employed and the pay is sometimes held back by the agencies or used for very pricey and small compulsory living quarters that are shared with other workers (SOMO 2013: 7-8).

f. South Korea

Facts and figures

South Korea's electronics industry began to grow in the 1960s with the assembly of radios. In 1975, there were already 168 electronic companies from Japan operating in South Korea. At the time, the US only owned 27. The reason why so many big electronic companies came to South Korea were low wages and its large home market for electronic products, but also the fact that the Korean state actively promoted vertical and horizontal integration (Sturgeon and Kawakami 2010: 17). South Korea has now developed from a mere production site of foreign companies to an industry where leading electronic brand companies are from South Korea, especially Samsung and LG. These are so-called "chaebols"[104], referring to a South Korean form of (often family-controlled) business conglomerate, controlled by a chairman who has power over all the operations. In 2013, the Samsung Group alone was responsible for almost 24% of South Korea's GDP (Simpson 2014).

South Korean companies are also well-known as foreign investors. From 1968 to June 2003, South Korean companies invested a total of US $42,190 million in 150 countries (Hyowon 2005: 47). The electronics sector was the second biggest sector behind textiles and clothes with 14.3% of all overseas investments in the manufacturing sector (Ibid: 50).

Labour issues

The average annual wage in the South Korean electronics industry is KRW 3.44 million, which corresponds to €2,472 (Han et al 2013: 8). Apparently, the more tiers one goes down the supply chain, the lower the wages are (Ibid: 9-10). Compared to other electronics companies in South Korea, Samsung pays the highest monthly wage of KRW 5.77 million (about US $5,317.63). However, this calculation includes managers' salaries and these wages do not apply to Samsung's subcontractors.

At small- and medium-sized companies, which make up 90% of all Korean electronics companies, the average wage is only KRW 2.67 million. Production workers earn less than KRW 2 million per month (Ibid: 9). As these companies supply low-cost parts, Samsung Electronics frequently switches between them and thereby increases price competition among them, which effects the workers directly.

Another critical issue in South Korea's electronics industry is the lack of influence of unions. Only 3% of South Korean workers (around 15,000 workers) in the

104 The term "chaebrol" consists of "chae" = wealth or property and "pol" = faction or clan

electronics industry are organised in unions. Approximately 2% of these are in the LG Electronics union, which is known as a company union (Ibid: 7). This situation is linked to Samsung as a leading electronics company in South Korea, which is known for trying to prevent their workers from forming trade unions both amongst workers contracted directly under Samsung but also with their suppliers. Only 300 of the unionised workers are employed under Samsung contracts (Ibid: 7-8).

Thus ongoing topics like migrant workers (Hyowon 2005: 65), discrimination of women and occupational health and safety deficiencies cannot be dealt with properly. Consequently, more than 200 cases of occupational illnesses and deaths at Samsung manufacturing facilities in Korea were only made public through long-term campaigning by families of the victims and workers and public health activists in Korea (Kyle 2014).

g. Mexico

Facts and figures

Since the middle of the 1980s, electronic companies have been relocating their production sites to Mexico. Especially brands from North America use the relatively close and cheap contractors to assemble their products. In 2001, due to a crisis in the ICT industry, large numbers of workplaces were shifted from Mexico to Southeast Asia. However, Mexico still held 3.4% of global exports of ICT products in 2005 (Butollo/Laufer 2008: 7-9).

In particular, the US-based ICT company HP has been using Mexican contractors since the 1990s when it started to shift production towards cheaper countries than the US. While at first it was mainly US companies that started production in Mexico, now other countries have shifted their production there as well. Contractors operating in Mexico include Flextronics, Jabil, Celestica and Sanmina.

Labour issues

Mexico's labour laws, historically a relatively strong framework, have been challenged through the liberalisation of the Mexican economy and its increased dependence on the world market and transnational corporations. This has led to problems and contradictions in labour policies, including low wages, highly flexible employment and oppressive labour policies (Lüthje et al 2013b: 156).

According to the Mexican Centre for Labour Reflection and Action (CEREAL), the three major problems concerning the Mexican electronics industry are low wages, temporary employment and no freedom of association (CEREAL 2011: 4). The average wage in the electronics sector is only 100 Pesos per day (US $8.3), which is not sufficient to live a dignified life, as living costs are high (CEREAL 2011: 6). The problem of temporary employment (unstable working conditions with temporary employment contracts lasting from 15 days to three months, cf. Butollo/Laufer 2008: 14) has become even worse since the labour reform in November 2012. It allows forms of contracts even by the hour and makes outsourcing legal within certain limits.

Although every electronics producing company in Mexico has signed agreements with trade unions, most workers do not know that they exist and are mostly not represented by them (Cereal 2011: 13). Genuine unions are the exception in Mexico. The majority of unions are so-called 'phantom unions', some set up and managed by corporate management ('white unions'), some corrupted unions under government control ('charros'). There are also 'black lists' of workers that are members of genuine trade unions and this systematic intimidation makes it hard for workers to demand better working conditions (Butollo/Laufer 2008: 17).

Civil society organisations also point out various other problems, including discriminatory and humiliating treatment and exposure to toxic chemicals (Cereal 2011: 4; Butollo/Laufer 2008: 12, 16).

h. Thailand

Facts and figures

In 2011, the electronics sector in Thailand generated US $55 billion in exports, which made up 24% of the country's export revenues (Thailand BOI 2012). In 2012, about 400,000 workers were employed in the Thai electrical and electronics industry (Ibid). Like other ICT producing countries, Thailand has special national policies on tax, duty-free imports of electronic components and tariff-free zones to attract foreign investors.[105]

Electronic manufacturing in Thailand is dominated by disk drive production, with the addition of printers in recent years.[106] Thailand is a worldwide leader in the production of hard disk drives (HDD) and a large part of its electronics industry consists of manufacturing of integrated circuits and the semiconductor industry. Mostly Thailand is used as an assembling site for global firms. Many big companies are located here: Electrolux, Seagate, Phillips, Hitachi, Fujitsu, Honeywell, Samsung, Sony and LG (Thailand BOI 2012).

Thailand's HDD production sites are mainly located in central and north-eastern areas, close to Bangkok (Ibid).

Labour issues[107]

A key issue in Thailand's ICT industry is the discrimination against migrant workers. The number of migrant workers from across Southeast Asia is estimated at two million. In particular, workers come from Cambodia, but also from Myanmar and other neighbouring countries with lower incomes. Thai law defines migrant workers as 'aliens'. Their passports are taken by employers and they work unregistered and therefore 'illegally'. This prevents them from getting health and social benefits. They are not allowed to join unions and they get significantly lower wages.

Thailand has not ratified International Labour Organization (ILO) Conventions No. 87 and 98 and instead has passed the Thai Labour Relations Act of 1975, which makes it very difficult to form unions due to a high burden of bureaucracy. Before registration and proper formation of the union, union members are not protected by law. Production facilities fail to allow employees their right of association and

105 Voices of Thailand. Electrical and Electronics Industry. http://voicesofthailand.com/invest-sector/electrical-and-electronics-industry
106 Michael Wan, Electronic exports: Identifying Asia's winners and losers, Credit Suisse, p. 5.
107 Sources: Interview with Jerome Hassler, Bangkok University, December 2013; Bais (2012).

to form trade unions. About 50% of all workers in the industry are employed by agencies and face similar problems as migrant workers. Some of the problems these workers face are the absence of full and sufficient payment, the missing protection from being fired at any time and that workers are forced to work too many overtime hours. Furthermore, workers encounter many health risks as they are not provided with proper protective clothing when handling toxic materials. Sick leave usually means no further payment as workers cannot come up with the appropriate health certificate. Women, who form the majority of workers in the ICT sector in Thailand, are often harassed by their employers when they become pregnant.

i. Vietnam

Facts and figures

The electronics industry is the second largest contributor to Vietnamese exports. About 500 companies employ 250,000 workers – 90% of whom are women and 70% are migrant workers (Huong 2013). In 2012, annual exports in electronics stood at US $36,235 million. Compared to other countries in Southeast Asia, this number is relatively small because Vietnam's electronics industry is still at an early stage (Okamoto 2003). However, as wages start to increase in some other Asian countries, Vietnam is becoming a more and more attractive place to manufacture electronics because of its low wages. In particular, the markets for cell phones and household appliances grew rapidly over the last couple of years (Maierbrugger 2012).

Companies located in Vietnam include Samsung, Intel and Jabil. Intel has placed its largest factory worldwide in Ho Chi Minh City (Ibid). Samsung has placed its largest factory worldwide in Bac Ninh (Tiessen 2011).

Labour issues

The Socialist Republic of Vietnam has strict labour laws. However, because of its interest in foreign investment, they are neither implemented nor controlled adequately. There is a lack of both independent unions and of civil society organisations (CSOs) working on labour issues.

Wages in Vietnam are the lowest of all countries in Southeast Asia (Maierbrugger 2012). Challenges include excessive overtime hours, temporary work and lax safety precautions by employers (Huong 2013).

j. Philippines

Facts and figures

Electronics goods have been produced and exported in the Philippines since the 1950s (Reyes-Macasaquit 2010: 153). Ever since then, the country's economic significance has grown exponentially. In the beginning of the 1970s, electronics distributed only 3% of total exports. However, by 2012 its export market share had grown to 43.11%, which corresponded to exports worth around US $22 billion.[108] The number of employees in the electronics sector grew constantly over the last years. In 2010, 500,000 workers in the Philippines produced electronics (BOI/DTI 2011: 8).

Today, the sector is dominated by big global players. Intel started to produce in the

108 See Table 6

Philippines in 1974 as one of the first chip manufacturers (De Haan/Schipper 2009: 18). Japanese companies like Hitachi or Fujitsu started to relocate their production facilities towards the Philippines in the middle of the 1990s (Tecson 1999). These three companies are still important players in the Philippines industry. Of the 936 IT corporations headquartered in the country, 78% are owned by foreign investors (Valenciano 2013).

The Philippines tries to lure foreign companies with cheap tax and investment conditions. Companies can register with the Board of Investment to receive better conditions or can base production in one of the special economic zones (BOI 2010: 12). In fact, most of the manufacturers can be found in the so-called 'Export Processing Zones' (EPZ) where they receive large advantages in terms of tax as well as duties. These advantages are determined by the Philippine administration offices like the Philippine Economic Zone Authority (Ibid: 17-19), but the zones themselves are mainly in the hands of private investors. For this reason, the state has relatively little influence within these areas, e.g. police have only limited authority and monitoring is conducted by private security personnel (De Haan/ Schipper 2009: 13).

In the Philippines there are several EPZs. 48% of the industry is based in the region of Calabarzon (Cavite, Laguna, Batangas, Rizal, Quezon), 42% in Manila, 3% in Central and North Luzon and 7% in Cebu (Valenciano 2013).

The focus of the Philippine electronic production is on the manufacturing of single hardware components. 50% of all 2.5" and 10% of all 3.5" hard drives, as well as 10% of all semiconductors worldwide, are produced in the Philippines (De Haan/ Schipper 2009: 10). The production of semiconductors alone generated 62.2% of total electronic exports in 2012, which corresponded to US $13.97 billion.[109] Most of the goods are exported to Japan, the US, China, Singapore and Hong Kong (Department of Trade and Industry (DTI) 2012).

Many of the world's most important producers or their subsidiaries are represented in the Philippines. Of the three largest hard drive brands worldwide, Toshiba (including incorporated Fujitsu), as well as Western Digital, produce there. Of the five biggest semiconductor manufacturers,[110] Texas Instruments and again Toshiba are situated in the Philippines. On the other hand, Intel closed its production site due to struggles during the global economic crisis in 2009 (Casiraya 2009). However, there are many other manufacturers still remaining like Dutch-based NXP,[111] US-based Amkor Technology[112] and Fairchild[113] or Japanese ROHM.[114] Furthermore, a growing number of subcontractors and EMS-companies (e.g. Fastech, Ionics EMS Inc. and Integrated Micro-Electronics, Inc.) have set up production around the central production sites.

Labour issues

Social problems in the electronics industry in the Philippines are mainly related to low wages and overtime hours, contract workers and limited opportunities to form trade unions.

109 Own calculation, based on data of the National Statistics Office (accessed in December 2012).
110 See http://www.isuppli.com/Semiconductor-Value-Chain/News/Pages/Qualcomm-Rides-Wireless-Wave-to-Take-Third-Place-in-Global-Semiconductor-Market-in-2012.aspx
111 See http://www.nxp.com/about.html
112 See http://www.amkor.com/go/about-us
113 See http://www.fairchildsemi.com/about-fairchild/cf/#Manufacturing-Sites
114 See http://www.rohm.com/web/global/

Minimum wages exist, but they vary within the 17 different regions and are fixed by the respective Regional Wage Board.[115] However, all of these wages lie beyond sufficient minimum living wages. According to data from 2008, average daily minimum wages were at 282 Pesos. However, wages that are adequate to cover basic living needs would have to be 783 Pesos. In principle, many workers earn higher wages, e.g. because of long-term contracts or paid overtime, but even that hardly ever adds up to more than 400 Pesos a day (De Haan/Schipper 2009: 24-25).

Overtime is expected almost every day. Work shifts of 12 hours for six days a week are not uncommon. Legally, overtime hours (more than eight hours a day) are permitted and can be requested by an employer in case of an 'emergency', as long as workers are being paid adequately.[116] Workers rely on overtime work to be able to cover living expenses and to even out their regular low wages. Furthermore, most workers think they are not allowed to refuse working overtime (De Haan/Schipper 2009: 26).

Contract workers do not get pay rises, they are not entitled to social benefits like continued pay when they are sick or holiday pay. Additionally, contract workers can be fired anytime and thus are exposed to a lot of pressure (Ibid: 30). The Philippine Labour Law limits the employment of contract workers,[117] but usually the restrictions are ignored (De Haan/Schipper 2009: 30).

Forming unions is permitted by law.[118] The same applies to the right to strike, even though various conditions have to be fulfilled that complicate any action that is actually taken.[119] However, in reality, employers usually handle cases with a policy of 'No union, no strike'. Threats, intimidations and even cases of murder of union leaders follow (ITUC 2012: 3). Unions that actually improve working conditions can only be found in a few factories. Most employers make their workers think that it is prohibited to form unions (De Haan/Schipper 2009: 28) or that the further existence of the whole factory is in danger if a union is formed.

Another problem is health risks for workers in the electronics industry in the Philippines. Most workers are not informed about implications to their health by their work environment, nor are they properly protected from toxic materials (Valenciano 2013).

k. Indonesia

Facts and figures

The electronics industry is not the largest sector in the Indonesian economy, as it only contributes 5% to annual exports (Global Business Guide (GBG) Indonesia 2013). However, annual electronics exports totalled US $13 billion in 2012. 250 electronic companies operate in Indonesia and employ 387,000 workers (GBG Indonesia 2013).

The Indonesian government has established free trade zones and special economic zones to attract foreign corporations, including labour-intensive light manufacturing such as assembly of light electrical goods and electronics. Among the benefits offered to foreign companies are exemption from some or all export taxes, duties on imports of raw materials or intermediate goods, direct and indirect taxes (ILO 2013a: 62). The establishment of free trade zones went hand in hand with a change in regulations in the 1990s that liberated the Indonesian market (Hertanti and Ceresna-Chaturvedi 2012: 11).

Most of the international corporations form joint ventures with local Indonesian companies to assemble imported components. Examples are Sony, LG, Samsung, Panasonic and Toshiba (GBG Indonesia 2013).

Many of the electronics manufacturing factories can be found in the Jakarta area, Java, Batam islands and Surabaya. Facilities of brand companies such as Sanyo (part of Panasonic), Toshiba and Samsung, but also a large number of small suppliers for electric components, are to be found in the area of Jakarta and especially in the neighbouring city Bekasi (Jakarta Post 2010; interview with Utermöhlen 16 August 2013).

Labour issues

Many of the workers in Indonesia are rural-urban migrants and most of them are young women. Thus in the case of Samsung's sites in Indonesia, 70% of the workers are migrants, mostly coming from Central Java and Sumatra Island (Mufakhir 2013). Outsourcing of work by agencies is also a huge challenge, as the outsourced workers do not get the minimum wage or other social benefits (ibid). Indonesia's average minimum wage was only around US $95 per month in 2012 (ILO 2013b: 18). Since 2012, several provinces have decided to raise the minimum wage (ILO 2013b: viii), but provisionally hundreds of companies will be exempt from paying it (Agusyanti 2013).

The maximum weekly working hours as set by the jurisdiction is 40 hours. However, many workers want to work overtime as the basic wage is not enough to pay living expenses (Hertanti/Ceresna-Chaturvedi 2012: 38).

Many employers try to suppress forming trade unions. In the last couple of years, however, Indonesian workers held some big and effective strikes in 2012 (Mufakhir 2013). In some factories, unions are encouraged. However, at others like Flextronic Batam only permanent workers and not temporary workers are eligible to join in (Hertanti/Ceresna-Chaturvedi 2012: 26).

l. India

Facts and figures

India's electronics industry started in the 1960s. In the 1980s, the government promoted the liberalisation of the Indian market and since then, the industry started to grow at an increasing rate (Alam 1990: 10). While it is still relatively small compared to other Asian countries, within India the ICT sector is one of the largest together with the automobile and textile sectors (Nowak 2013). Within the market, however, consumer electronics make up the largest segment. Electronic components make up the highest export figures in the sector (US $10,174.173 million exports in 2012, SITC; CCI 2013: 2).

115 Philippine Labour Code: Article 99 and 124, cf. http://www.dole.gov.ph/labor_codes
116 Philippine Labour Code: Article 87 and 89.
117 Philippine Labour Code: Article 106.
118 Philippine Labour Code: Article 243, cf. http://www.dole.gov.ph/labor_codes
119 Philippine Labour Code: Article 263.

India has set up Special Economic Zones that provide incentives like tax reduction or no tariffs and attract transnational corporations (Hertanti/Ceresna-Chaturvedi 2012: 12).

Companies' headquarters are in Bangalore, Gurgaon, Noida and New Delhi (Pratap 2013: 8). Samsung, Nokia, Foxconn, Flextronics and Jabil are just some of the global players doing business in India (Ibid.; Hertanti/Ceresna-Chaturvedi 2012: 27 ff.).

Labour issues

Labour laws are comparatively strict in theory, but they are often not implemented in practice. By law, all the labour regulations apply to the special economic zones in India, too. This includes health protections and safety regulations, freedom of association, a maximum working week of 48 hours and minimum wages.

Unfortunately, however, the laws are not respected by employers and most workers do not know about their rights. Approximately 80-100% of workers in the industry are contract workers (Nowak 2013). Their job security is very low and they are also not eligible for the benefits of permanent workers such as bonuses or paid leave (Hertanti/Ceresna-Chaturvedi 2012: 3).

While overtime work is rare in India, wages are very low. It is estimated that almost half of the workforce does not even earn India's minimum wage, which is US $2.18 or $3.40 per day, depending on the region (US HR Report 2012: 60).

India has not ratified the ILO conventions that protect collective bargaining and the right of association. In some provinces, trade unions can only be registered if company management agrees. This leads to a lot of unions in factories, which are both founded and paid by the management. Still, Indian workers do not accept this situation and there are many strikes such as the long-term strike in spring 2013 at NokiaSiemens Network in Chennai (interview Nowak, 18 December 2013).

m. Brazil

Facts and figures

The Brazilian electronics industry began to develop in the 1960s and is steadily growing. In 2004, goods worth US $27.9 billion were sold and produced by 132,900 employees, while in 2011, sales were already at US $82.5 billion with 180,300 workers being employed (Abinee 2012: 6).

In the electrical and electronic market in 2011, IT products had the greatest market share at 32%, followed by industrial equipment (16%), telecommunications (14%), household appliances (12%), generation, transmission and distribution of electrical energy (9%), electrical and electronic components (7%), electrical installation material (7%) and industrial automation (3%) (Abinee 2012: 8).

The regions that Brazilian electronic products are being exported to have changed during the last ten years. While in 2004, 29% were exported to the US, in 2011 this figure declined to only 15%. Latin American countries have the largest share (51% in 2011), while the European Union has 15% (Abinee 2012: 14).

Due to a tax reduction by the Brazilian government, Foxconn started to produce Apple iPads in Brazil in 2011. Many other big global players set up facilities as well, e.g. Samsung, Motorola, LG and Huawei. US-owned Cisco, which started local manufacturing in Manaus, Brazil, in early 2011, announced the year after that they wanted to expand their business in Brazil. This included the expansion of local manufacturing in the country, as well as confirmation of their long-term commitment (Cisco 2012a/b). Many of the Brazilian production sites are situated close to or inside the Amazon, as the Zona Franca of Manaus is a historical low-tax region attracting foreign investors (Economist 2000).

Labour issues

Foxconn's production sites in Brazil look quite different from those in China, for example. Due to Brazilian labour regulations and comparatively strong trade unions, less overtime hours are expected, workers are not allowed to work more than 44 hours per week, and they receive some benefits like health insurance and maternity leave (AFL-CIO 2013). The average wage of workers in the Brazilian electronics industry is 28.5 Real, which is roughly US $15.8 a day (Cereal 2011: 6-7). However, although the average wage is higher than for example in Mexico, the Philippines or Thailand, because of its purchasing power in Brazil, it can only cover 80 of the employees' basic needs, thus not covering the living costs.

In spite of relatively strong labour regulations, implementation by companies also fails here. In contrast to other countries, Brazil seems to react positively to such labour violations. For example, the Brazilian government filed a lawsuit against Samsung because a production site in the Amazon failed many of the government's compulsory working conditions. An audit found out that Samsung's employees worked up to 15 hours a day, did not get their mandatory days per week off and were exposed to dangerous and health risky work environments (Almeida/Kim 2013).

n. Sri Lanka

Facts and figures

The Sri Lankan electronics industry is not as globally oriented as other Asian countries and there are not as many foreign investors involved. Therefore, compared to the garment and textile industry, the electronics industry does not have such a large market share and is not as important. However, total exports of electronics were still worth a considerable US $211 million in 2012 (SITC; Sri Lanka EDB 2013), and roughly 100 companies employ 10,000 workers (LBO 2011).

The government of Sri Lanka is keen to promote Sri Lanka as an ICT investment destination. Accordingly, Sri Lanka has a government-owned Information and Communication Technology Agency (ICTA), which is the coordinator of the country's 'e-Sri Lanka Initiative'. They want to "re-brand Sri Lanka as a destination of choice for ICT products, services and investments", amongst other things by "branding Sri Lanka as an attractive location for global Multi National Corporations to set-up operations" (ICTA 2013).

Most of the companies operating in Sri Lanka are small- and medium-sized enterprises and usually employ ten workers or less (TVEC 2013). The largest shares of electronics exports are with boards and panels, electrical wires and transformers.

About 90% of the companies are located in the Western Province, especially in Colombo and Gampaha (Ibid). Sri Lanka introduced an EPZ that cuts taxes for foreign investors, does not charge tariffs and provides the infrastructure needed for production (Sivananthiran 2010: 10).

Labour issues

Sri Lanka has ratified all the most important ILO conventions. However, in particular the right to freedom of association is not well established (Sivananthiran 2010: 11-12; ITUC 2010: 3). These problems are especially severe in EPZs, where the government has encouraged employers to recognise 'employees' councils' as a substitute for trade unions (ITUC 2010: 4). Even where collective bargaining occurs, the government can and does make strikes illegal by declaring any industry an 'essential service'.

3. Conclusion and further trends

China is still the most important centre for ICT production, especially with regards to assembly and component manufacturing. However, most of the neighbouring Asian and other developing and emerging economies are key sites for ICT manufacturing too. This report shows the impact in terms of revenue and in terms of workers affected by the trend towards ever cheaper and faster production cycles in the ICT sector, even in countries not known as key ICT industries. It is still to be researched whether other neighbouring countries like Laos, Cambodia, Myanmar and Northern Korea already include ICT manufacturing and to what extent.

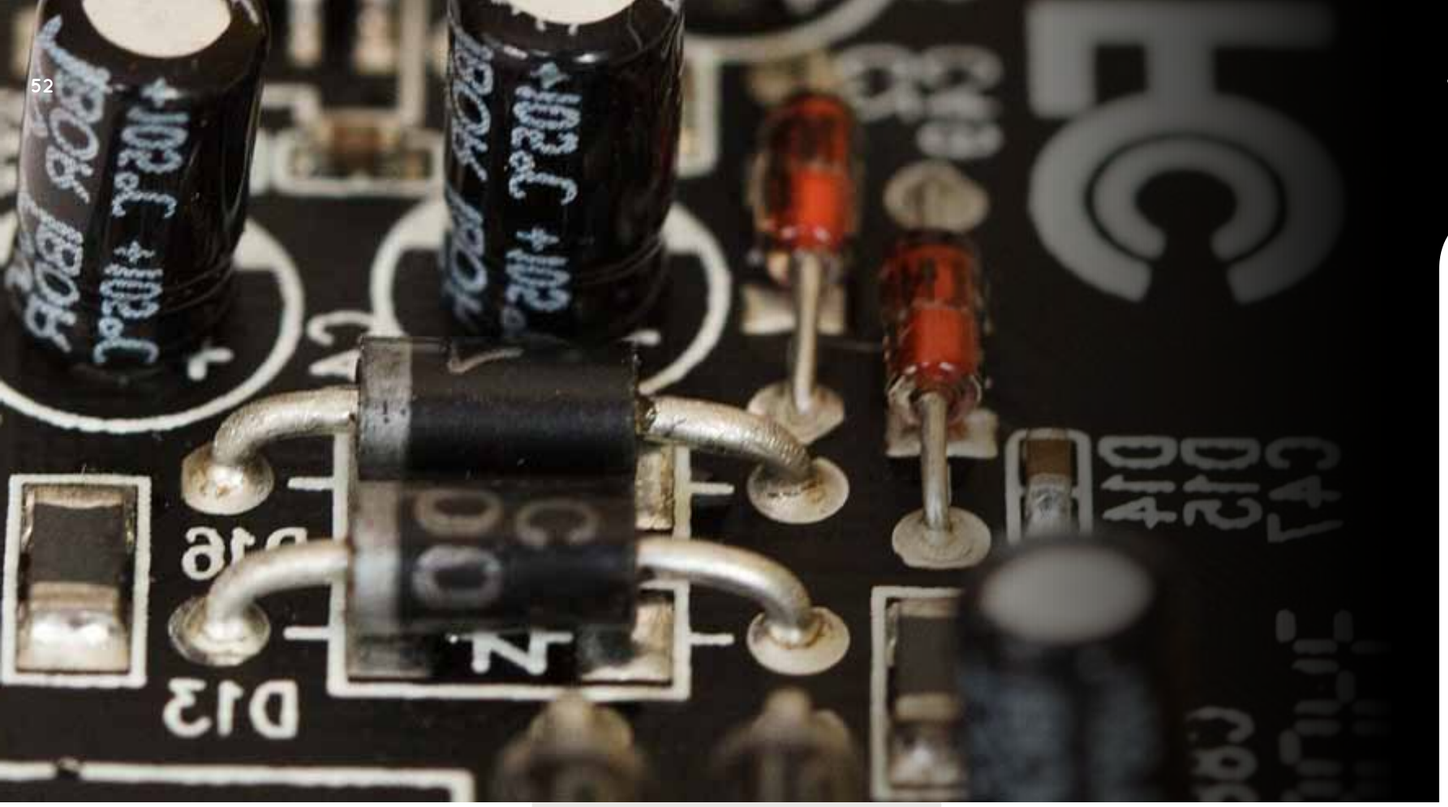
As already mentioned above, rising wages in China culminate in several shifts in the market towards new low-wage countries. A similar trend is to be seen in Indonesia, as an ILO report from 2013 states: "increase in wages is causing firms to assess enterprise viability, particularly in labour intensive manufacturing. As a result, firms are lodging applications to delay the onset of minimum wages and considering relocation options. 2013 may see a decline in the overall employment situation in Indonesia as wage adjustments take place." (ILO 2013b: viii).

However, in production other factors than personnel costs are relevant. Thus, the electronics sector has specialised suppliers that are concentrated in clusters. Market analysts state: "The larger the cluster, the more valuable it becomes. This snowballing phenomenon generates an increasingly powerful supply chain, so only a combination [of] factors will lure suppliers to new manufacturing locations over supplier-dense meccas such as Shenzhen and Dongguan" (Kameny 2013). The existing clusters in China, Indonesia and Malaysia will presumably not be relocated to other countries presently, as "the primary value of the cluster is the sheer number and density of electronics suppliers within the cluster – this supplier volume and density creates a network of suppliers with strong relationships that reside within close proximity to one another. Economies of scale in sourcing, production and logistics all contribute to efficient and cost-effective manufacturing" (Ibid).

Another interesting trend in the other direction is to be observed, as companies like Foxconn, Lenovo[120] and Quanta plan to produce increasingly back in the US.[121] For example, Google Glass from Foxconn is to be manufactured in the US.[122] Apple also announced it was investing US $100 million in its own manufacturing sites in the US.[123]

Another possible trend is the industrial automation of ICT manufacturing. According to the CEO of Foxconn, Terry Gou, in a statement made in 2011, the leading contract manufacturer plans to install 1 million robots in manufacturing in the next three years.[124] According to a report from 2012, the degree of automation at a Foxconn factory in Shenzen led to a decline of work done by human beings. To what extent this capital intensive form of production might be used by other contract manufacturers remains to be seen. Foxconn at least plans to "roll out the first fully automated plants" in the next five to ten years.[125] However, these are just small investments compared to the investments in low-cost countries.

120 See http://www.isuppli.com/Manufacturing-and-Pricing/News/Pages/Fast-Facts-on-Apples-PC-Outsourcing.aspx
121 See http://evertiq.de/news/12881
122 See http://www.isuppli.com/Manufacturing-and-Pricing/News/Pages/Fast-Facts-on-Apples-PC-Outsourcing.aspx
123 See http://evertiq.com/news/24430
124 See http://news.xinhuanet.com/english2010/china/2011-07/30/c_131018764.htm
125 See http://www.theverge.com/2012/12/11/3753856/foxconn-shenzhen-factory-automation-manufacturing-US-expansion



V. Conclusion

The ICT sector is a highly networked industry with rapidly changing markets. Regular mergers, takeovers and corporate restructuring, as well as the continuous launch of new products, characterise this fast-paced sector. Companies or countries that rely on a product or product components that are regarded as outdated are quickly devalued by financial analysts.[126] A top supply chain organisation in this sector is recognised as one that finds strategies like 'lean manufacturing practices',[127] to face the 'operational risks' of ICT manufacturing, especially rising wages in a business model that is built upon outsourcing to low-cost countries. The rise of wages leads to a geographical reorientation of both brands and contract manufacturers.

It is necessary to counter these structures and developments with a clear message by consumers. But what leverage do consumers – both private consumers and the public sector – have to change the social issues in the supply chain that have been highlighted in this report? The numerous CSR-reports of both brand companies and even contract manufacturers show that public awareness has led to a general climate in the ICT sector where 'social performance' is a relevant factor when it comes to making purchases. Both the media outcry after the suicides of Foxconn workers due to inhumane work pressures in 2010 and recently the first two ICT products (FAIRPhone and Nager-IT) with their attempt to produce socially responsible products and their unprecedented supply chain transparency led to significant pressure on the sector. However, CSR reports and voluntary non-independent audits do not result in real changes, as ongoing news about exploitations in the ICT sector show.

In the absence of socially responsible manufactured alternatives (with the above-mentioned exceptions), the power of private consumers is limited to long-term public pressure. However, public procurers with large tender volumes and long-term contracts do have the chance to make concrete changes through their purchasing power, by demanding socially responsible manufactured products.

What leverage the public sector has is a two-fold question: it concerns both the question of the leverage of (European) public purchasers (compared with consumer markets all over the world) and the question of who to address, i.e. the power structures within ICT supply chains.

As shown in Chapter II of this report, the public sector's spending on ICT products is enormous and increasing, and brand companies regard public sector buyers as important customers. The question remains whether brand companies are the right target group, as contract manufacturers have become such key actors in the ICT supply chain.

126 See, for example, Wan, Michael: Electronic exports: Identifying Asia's winners and losers, Credit Suisse (2013), http://www.credit-suisse.com/researchandanalytics
127 Gartner Identifies Top Supply Chain Organizations in Asia Pacific for 2013, http://www.gartner.com/newsroom/id/2580318

It has been stated before that leverage is difficult to achieve, as the brand companies – as the 'face' of products – are the only ones that might suffer from competitive disadvantages through awareness-raising campaigns. However, due to their transfer of know-how and manufacturing coordination to contract manufacturers, they do not have enough impact on the manufacturing process. Thus Beck (2012) concludes that contract manufacturers play a crucial role in complying with and enforcing social standards in the ICT sector due to their central position as coordinators in supply chain management and their growing importance and size (Beck 2012: 16). According to his analysis, contract manufacturers are no longer dependent on brands due to their extensive production and process know-how that brands have handed over. At the same time, contract manufacturers' comparatively low profit margins leave them little possibility of introducing changes. Contract manufacturers strive for standardised ways of production, which might be opposed to different social standards for workers for different customers. Beck argues that image induced risks to sales are not probable for contract manufacturing brands and thus their interest in social improvements is limited. He argues that only a common approach by all brands might have an impact on contract manufacturing companies (Ibid: 16-17).

Although this might be true in contract manufacturers' relationships with end consumers, the statements of the big contract manufacturers in their external presentations speak a different language when it comes to their relationship with the brand companies. Almost every one of these companies has positions on their social commitment, thereby addressing their customers, i.e. the brands' interests. This leads to the conclusion that contract manufacturers might well fear competitive disadvantages when failing to provide some kind of a social responsibility management.

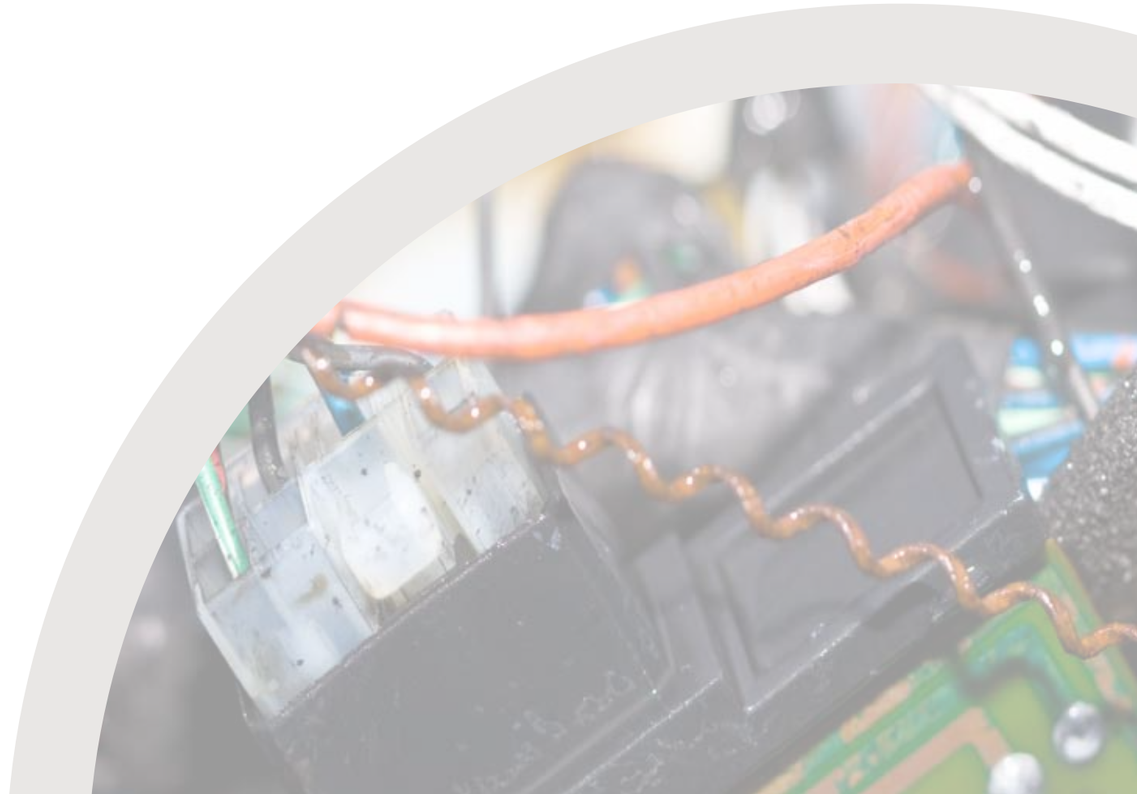
Furthermore, there are several indications that brand companies do have leverage over even major contract manufacturers. Thus the statement by the EMS contract manufacturer Sanmina-SCI (US) provides some insight into the power relationship between brand companies and contract manufacturers: "Even in those cases in which customers are contractually obligated to purchase products from us or repurchase unused inventory from us that we have ordered for them, we may elect not to immediately enforce our contractual rights because of the long-term nature of our customer relationships or for other business reasons and may instead negotiate accommodations with customers regarding particular situations" (Sanmina 2012: 12). Another indication would be that Apple delivered 5 million Iphones back to contract manufacturer Foxconn last April due to appearance and function problems, which was estimated to cost Foxconn US $256.8 million.[128]

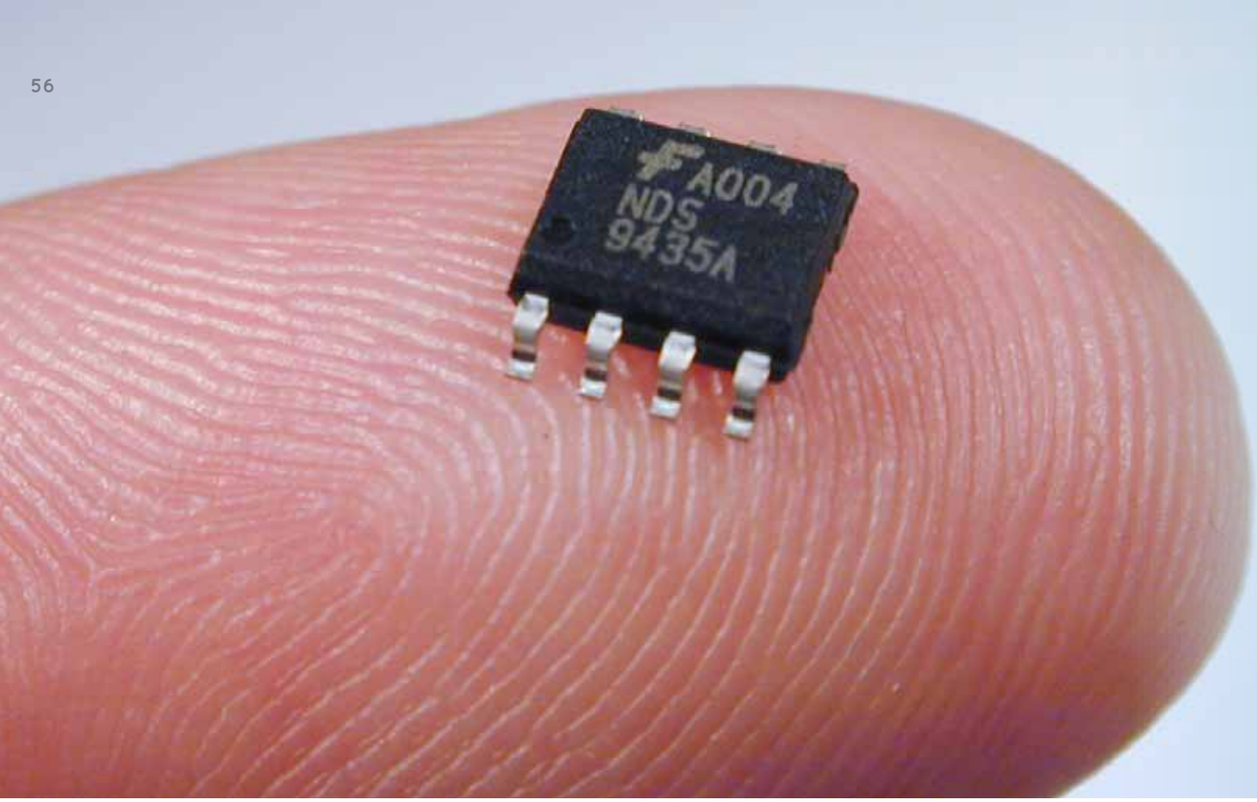
Last, but not least, several indicators that price negotiations with all or most of the important suppliers further down the supply chain are done by several brands themselves show both that brands have not handed over all of the supplier coordination power as it might seem. In contrast to frequent claims to the contrary, they have a direct influence on the question of fair wages.

128 See http://evertiq.com/news/24244

It is also important to bear in mind that the existing labour conditions in the ICT sector are not only a by-product of the production process (Beck 2012: 11; Raj-Reichert 2012: 126). The structure and mechanisms leading to low wages, overtime and other poor working conditions are linked directly to flexibility and low profit margins, tracing back to business competition about market shares.

Social criteria are not yet perceived as enough of a competitive advantage. To apply the pressure and the leverage they have, public procurers with an interest in socially responsible ICT products need to tread a common path. As mentioned above, the public sector holds considerable leverage over the ICT industry because of their large annual spending on ICT hardware, as well as their long-term contracts with ICT companies. Public buyers are realising that they can strengthen their market power and their bargaining position when they join forces. Many are joining the new ElectronicWatch initiative. Together, consumers and public purchasers can make ICT companies and distributors aware that improving working conditions all the way along their supply chains is not optional when it comes to making decisions about which products to buy in future.





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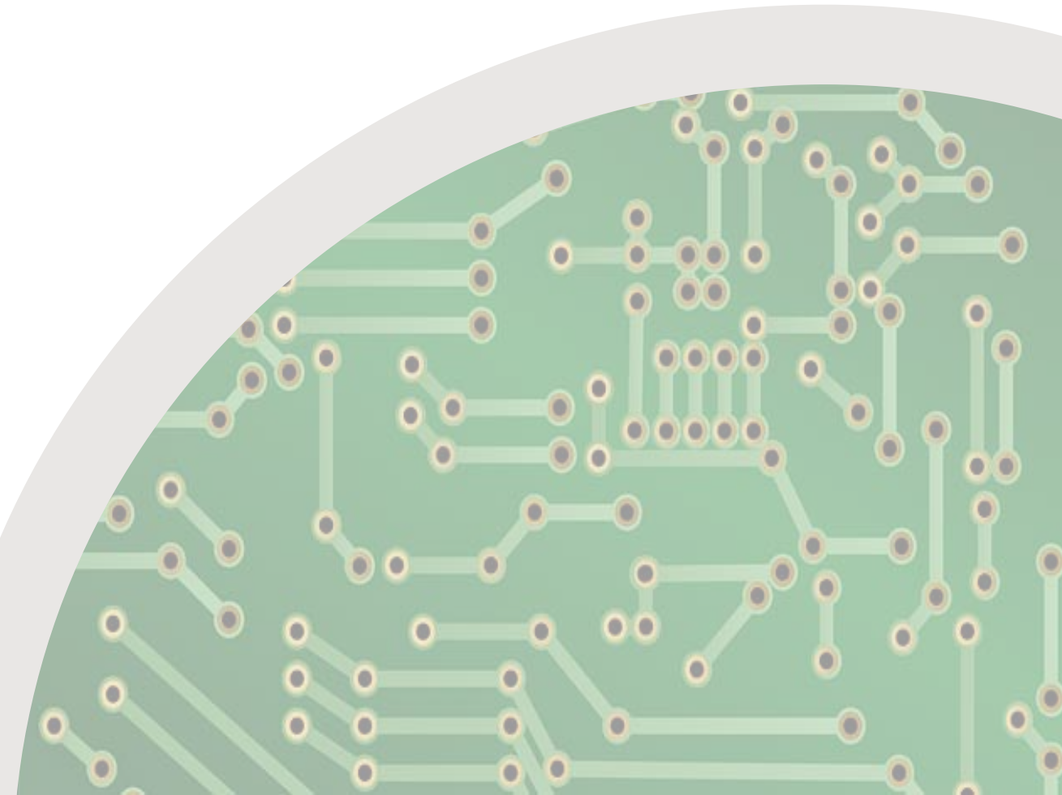

VII. Appendix

Selected literature on subcontracting in the electronics industry naming suppliers of the second and following tiers.

APEC (Asia-Pacific Economic Cooperation) (2013): Wood, Christopher; Tetlow, James: Global Supply Chain Operation in the APEC Region: Case Study of the Electrical and Electronics Industry, APEC Policy Support Unit, July 2013, cf. http://publications.apec.org/publication-detail.php?pub_id=1431 (case studies on smartphone and laptop supply chains).

Bormann, Sarah; Geiermann, Astrid; Streit; Miriam (2009): Live fast, die young. Briefing paper WEED, Berlin http://www.pcglobal.org/files/WEED_briefing_paper_final.pdf (1st tier Meitei Plastics and Electronics, Dongguan City, China, keyboards for HP, Dell, Lenovo, Microsoft, IBM)

CEREAL (El Centro de Reflexion y Accion Laboral) 2009: Labour rights in time of crisis. Mexico (mainly 1st tier: Dell, IBM with labour leasing by APRO, Aplotran).

China Labor Watch (2012): Beyond Foxconn: Deplorable Working Conditions Characterize Apple's Entire Supply Chain. http://chinalaborwatch.org/pdf/2012627-5.pdf, pages 6-11 (1st tier contract manufacturers and subsidiaries of the contract manufacturer Foxconn: BYD, Jabil, Riteng Computer Accessories, Kenseisha, Catcher, United Win, AVY Precision, TOYO Precision Appliances, Tenglong, all China).

De Haan, Esther; Schipper, Irene (2009): Configuring Labour Rights. Labour Conditions in the production of Computer Parts in the Philippines. SOMO & WAC, Amsterdam, cf. http://somo.nl/publications-en/Publication_3109

Dijk, Michiel van; Schipper, Irene (2007): Packard Bell, CSR Company Profile, cf. http://somo.nl/publications-en/Publication_1969 (Paragon as 3rd tier supplier, HDD sub-supplier to HDD supplier Mektec besides LTT, MMI, Innovex, and Murata).

Han, Jiwon; Liem, Wol-san; Lee, Yoomi (2013): In the Belly of the Beast: Samsung Electronics' Supply Chain and Workforce in South Korea. Electronics Industry in Asia Research Paper Series No 3, http://www.amrc.org.hk/system/files/3%20Samsung%20Electronics%E2%80%99%20Supply%20Chain%20and%20Workforce%20in%20South%20Korea.pdf (description of the "five layers" of component production and supply for Samsung Electronics with concrete company names).

Jordan, Susanne (2013): Graph Nager IT 2013: comparably comprehensive example of a supply chain for the computer mouse provided by the German firm NagerIT: https://www.nager-it.de/static/pdf/lieferkette.pdf

Lüthje, Boy; Siqi Luo; Hao Zhang (2013): Beyond the Iron Rice Bowl: Regimes of Production and Industrial Relations in China (case studies in China from different tiers, without naming the companies).

Raj-Reichert, Gale (2012): Governance in Global Production Networks: Managing environmental health risks in the personal computer production chain, p. 186 ff., http://labourandelectronics.net/wp-content/uploads/2013/06/Governance-in-Global-Production-Networks-Managing-Environmental-Health-Risks-in-the-Personal-Computer-Production-Chain.pdf (1st and 2nd tier HP suppliers in the printed circuit board industry in Penang, Malaysia).

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