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RESEARCH

Secrecy at the End of the Recycling Chain: The Recycling of Plastic Waste in Surabaya, Indonesia

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The aim of this article is to address the question: Why companies which produce or use pellets made from recycled plastics choose a strategic invisibility for their activities. The recycling of plastics is a process spread over an extended recycling supply chain. The negative stigma associated with recycled plastic in Indonesia is directed away from the factories towards the waste-pickers, junk-dealers and grinders who work the waste manually from which the recycled plastic is selected. Their remoteness from the source not only allows the factories to shake off the opprobrium of working with waste, they can also distance themselves from what goes on earlier in the supply chain. They are not held accountable for possible environmental or social mismanagement in the sorting of plastic waste. The factories, nevertheless, manage to maintain control over this supply chain by setting standards for the materials they accept. The factories have the power to declare which supplier is up to standard and which is not, and have the alternative of opting for virgin plastic made from mineral oil, which keeps prices of recycled plastic low. This conspicuous invisibility is convenient for all involved in the recycling industry in the short run, but more openness would be better for all sides.

Keywords: recycling; value chain; supply chain; plastic waste; Indonesia; production of recycled plastics

Introduction

It was a long taxi ride to the fringes of the city of Surabaya (Indonesia) to find the factory which was, according to information found on the Internet, producing plastics from recycled waste. In vain I had tried to contact the managers or owners in advance and was now trying my luck by paying a surprise visit to the factory. The plant turned out to be at the far end of a side road, surrounded by a high wall. No activity was discernible inside or around the wall. When I knocked on the iron gate, a small hatch in the gate opened and the face of a guard appeared. With an amused look on his face the taxi-driver, who had parked his vehicle in the shade, observed my attempt to talk the hind legs off a donkey. No matter what argument I came up with, nothing could persuade the gatekeeper to let me in. I gave up after he had consulted either a peer or superior and still would not even allow me a glimpse at the building from the gate. '*Sekarang mau ke mana, Pak?*' (Where do we go from here, Sir?), the taxi-driver asked, struggling to keep a deadpan expression.

Following the classic opening of Clifford Geertz's article 'The Balinese cockfight', anthropologists like to begin their articles with a vignette which *inter alia* shows their rapport with their research subjects. Was I such an incompetent fieldworker? Musing over my actions while the taxi-driver ferried me to my next destination, it occurred to me that the invisibility of the factories formed a pattern, and this particular factory was just an extreme case. Well-informed people like the founders of an NGO working on the reduction of waste or high-ranking staff of the municipal cleansing department had never had much to say about these factories. Local scholars and friends, who often introduced me to all sorts of people, could not help me with a single useful contact in this business. Whenever I interviewed a junk-dealer and asked whether he or she sold sorted out recyclables to a factory, another intermediary always seemed to loom in the chain before the materials were delivered to the factories. There was no reason to believe that I as a foreigner was an obstacle: Indonesian scholars specialized in waste studies have also found the recycling industry impenetrable (Gabriel Andari Kristanto, personal communication).

Is the low profile of the recycling business deliberate? If so, what is the reason? Their chosen invisibility is at first sight surprising, because they could profit from a potentially positive image as caretakers of the environment. The aim of this article is to address the question of if and why entrepreneurs who recycle plastics have opted to don this cloak of strategic public invisibility in Indonesia. As there is a dearth of anthropological research on factories producing and processing plastics, especially in proportion to the abundant studies of waste-pickers, I also want to find an answer to a series of basic questions about the factories: What is the business logic of these industries? From where do they source their materials? How do the materials they use affect the production process? What

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kind of products do they make? To whom do they sell their products?

I argue that commercial considerations determine the low profile of the recycling business. On the whole, solid waste is effectively managed in Surabaya, because it is a business run on market principles, with only a small role assigned to the government (Colombijn and Morbidini 2017). There is money to be made from recyclables. Precisely the same neo-liberal logic means that the nature of recycled products must be concealed, because products from recycled plastics do not elicit the same positive associations from customers as they do in the Global North. On the contrary they are treated with distrust. Factories at the end of the recycled plastics chain dominate the system and have strategically chosen to stay out of sight, allowing the social opprobrium to fall on the much more visible waste-pickers and junk-dealers.

From 2009 to 2019 data for this research were collected during a total of 26 weeks of intermittent ethnographic research on urban environmental issues in Indonesia. Most of this research took place in the city of Surabaya and focused on two broad themes: urban solid waste management and community initiatives to improve the environment on the neighbourhood level. In my research on Surabaya's environmental problems, I focus on household waste because it involves practically everybody in the city and offers a good insight into the driving forces behind environmental behaviour. I have used the standard ethnographic mix of (participant) observation, qualitative interviews, finding respondents through theoretical sampling and snowballing, and the study of documents.

I have tried to follow the household waste through the city, but initially was never admitted to factories which recycle resources. Junk-dealers always referred to another link in the chain before their goods reached the factories. In 2016 I decided to work from the other end of the chain and go directly to these factories. Even then it was difficult to get into the factories and meet managers. Some were only persuaded after I had paid their factory a surprise visit. Other persons consented to an interview after extensive text-messaging back and forth because, as one owner of a company producing plastic goods explained, 'I wanted to see whether you were serious'. Ultimately, I managed to conduct twelve interviews with people employed by companies working with recycled plastics; some interviews were conducted with two or three persons at one time and with two persons I met twice. With one exception, I never set eyes on the production facilities as I was welcomed, and effectively halted, in an office near the entrance. Four interviews took place in a café, away from the company premises and, although I do not know why my interlocutors preferred to meet in such a neutral place, the location might be yet another indication of the secrecy surrounding the recycling industry. It is also significant that the best interviews were with two men who had studied in Western countries and were therefore perhaps more open towards me, and two men who were leading figures in Asosiasi Daur Ulang Plastik Indonesia (ADUPI, Association for the Recycling of Plastics in Indonesia) who had an interest in plugging their views through me. This apparent reluctance to talk is in my experience unusual even among business people, but conveys the chosen low profile of the recycling business.

Another explanation of the companies' secrecy is that the managers and owners I spoke to wanted to conceal either poor working conditions or breaches of state production rules. I did not find evidence of this alternative explanation. The last labour unrest in the newspapers dated from some years ago. One company had just passed the first round of an international ISO audit. The same company showed a permanent video of the production process in the waiting-room for visitors but, despite this openness for the ISO audit and on the TV screen, my three interlocutors did not have permission to show me the plant. The manager of another company apologized they no longer allowed visitors into the production hall after an incident of industrial espionage (a statement which is plausible, but could not be verified by me). The director of the NGO Ecoton (Ecological Observation and Wetland Conservation) did not list the recycled plastic factories among the top three most polluting industries of rivers (Prigi Arisandi, personal communication). The only factory at which I was given a tour had open, light, and relatively clean halls in which labourers greeted me in a relaxed manner. I do not rule out that the companies tried to shield themselves from prying eyes, but have no reason to believe this was the major motivation behind their efforts to stay under the radar.

Conceptualizing the Trade in Recyclable Plastics

The recycling of plastics in Surabaya can be analysed using concepts derived from global value chain or supply chain theories. The concept of global value chains helps reach an understanding of the globalization of production processes in which transnational corporations outsource non-core economic functions (usually including physical production) and concentrate on innovation, product strategy and marketing. Once the production process is no longer in the hands of one producer, global production processes require new forms of governance to integrate spatially spread out economic activities. The related concept of supply chain shifts the emphasis more in the direction of economic transfers between producers and suppliers and less on the unequal power relations implied in the concept of value chains.

The control of value chains can take different forms which must be studied empirically in each case. Key questions in this respect are: How are the standards necessary to integrate components into single products established? How is the fragmentation of production connected to the mobility of goods, people and concepts? Who exerts most control over the value chain? Who reaps the most benefits (Gereffi 2005; Gereffi, Humphrey and Sturgeon 2005; Crang et al. 2013: 12l; Tsing 2009: 148–149).

The concept of global value chains has been applied to waste 'recycling value chains' in which 'value is made in recycling – not just through collection, but also through

sorting, separation, preparation, and treatment, and then through compaction, packaging and storage' (Gregson and Crang 2015: 158). Plastics go through a number of transitions during their lifecycle, from object, to waste, to resource and a new object; the meaning and appraisal of the plastics changes continuously throughout the process and with most of these 'translations' (Tsing 2015: 162) they are passed on into the hands of another actor.

Global value chain or supply chain analysis can fruitfully be combined with two other theoretical approaches to waste: technocratic municipal solid waste management (MSWM) and the debate how to build a circular economy (CE). Studies of municipal solid waste management have by and large ignored the importance of waste as a resource, but the problem of how to manage the daily volume of waste becomes easier if a part is sorted out and recycled and never reaches the final deposit site. Recycling of resources is one of the ways to achieve a circular economy and Genovese et al. (2017) argue that sustainable supply chains should be part of the transition to a circular economy.

Studies of the transition to a circular economy are usually conducted on a national or global level, but the principles can also be applied on the urban level (Ghisellini, Cialani and Ulgiati 2016: 22). The key question of governance in global value chains can unhesitatingly be posed for local value chains too: '[I]f production is increasingly fragmented across geographic space and between firms, then how are these fragmented activities coordinated?' (Gereffi, Humphrey and Sturgeon 2005: 80).

Plastics in Indonesia and Surabaya

Surabaya is the largest city of Indonesia after Jakarta, the national capital. Indonesia is a newly emerging economy with uninterrupted economic growth figures since the Asian crisis of 1989. Economic growth means a rapidly expanding middle-class, which aspires to higher consumption and produces growing volumes of waste, the bulk increasingly non-organic. Without proper handling of municipal waste, the city might become unliveable.

The importance of effective municipal solid waste management extends beyond the city border. A much-cited article by Jambeck et al. (2015) claims that Indonesia is the second largest contributor to the plastic soup in the marine environment. Jambeck et al. (2015) estimate that Indonesia produces 0.52 kg per person per day, of which 83% is mismanaged. Plastics make up 11% of the total waste production. Another study states that the Brantas River, which flows through Surabaya, before reaching the Madura Straits, is the sixth largest riverine route of waste into the sea in the world (Lebreton et al. 2017; see also World Bank 2018).

Plastics are a sign of the growing prosperity of Indonesia. Just a few decades ago food snacks sold along the roadside were wrapped in banana leaves, a cheap, abundant and perfectly biodegradable material (MacRae and Rodic 2015: 311). Alternatively, snacks could be sold in old paper sold by kilogram by office staff; these wrappings offered a researcher the chance of finding interesting data about that office. This wrapper was innocuous apart from the ink. Today, by contrast, plastic bags are routinely given away by both shops and food stalls. Street vendors who were hawking tea or home-made soft drinks have made way to people selling water in plastic bottles. The remains of these bags and bottles can be found along railway lines, in canals, along roadways and on riverbeds. In February 2016, a new State policy prohibited the handing out of free plastic bags by shops but proved ineffectual because the prices charged for them were smaller than the smallest coin in circulation. Later corporations which influenced the Indonesian government had the policy abrogated.

The collection and disposal of solid waste in Surabaya is the joint work of the municipality and many private actors, from waste-pickers to large factories processing recyclables and a company which is contracted by the municipality to run the landfill. The collection of urban solid waste begins on the neighbourhood level. A neighbourhood is responsible for the collection of its own waste and the households jointly pay a man or woman who gathers the waste door to door. The collector dumps the waste at a temporary disposal site (Tempat Pembuangan Sampah Sementara, TPS) or waste transfer station, of which there are around 170 in Surabaya. From here the municipality assumes responsibility and municipal cleansing department trucks transport the waste from the temporary dumping sites to the final waste disposal site (Tempat Pembuangan Sampah Akhir, TPA), the landfill Benowo, at the fringes of the municipality. The landfill is operated by a private company, PT Sumber Organik, which is paid per unit weight by the local government.

The reality is much more complicated and varied than the formal system described above and another variable is thrown into the mix by the market for recyclables. Household waste is not rubbish but a potential commodity. Waste-pickers (*pemulung*) operate along the chain, searching for saleable waste: plastics, paper, cardboard, metals, glass bottles, cans, *et cetera* (see also Wanatabe et al. 2018). Waste-pickers go from bin to bin, both in the neighbourhood and along the thoroughfares. The people who collect the waste from the neighbourhoods divide their time between collecting waste and sorting it at the temporary dumping sites. Other waste-pickers operate at the landfill or final waste disposal site. Some neighbourhoods with a strong environmental awareness have set up a waste bank (*bank sampah*), at which household rubbish is collected and sorted out.

The recyclables are bought up by junk-dealers (*pengepul*). Some junk-dealers are found scattered throughout the city but others have set up business near the landfill; all employ labourers who sort the waste into more fine-grained categories. The junk-dealers themselves constitute a complex network. Some are wholesalers buying up stuff from smaller junk-dealers. Others are of the same scale but exchange goods, each specializing in one kind of recyclable. Plastics pass through several hands, each progressively cleaning the plastics and dividing them into more specific groups, until finally they are sold to factories which process them. What I have sketched here is just

a rough outline and, if one zooms in, the overall impression is a system of bewildering complexity.

Only rough estimates are available of the amount of plastics which is recycled and different sources can give quite disparate figures. According to a World Bank Report (2018: 19), Surabaya generates 2,483 tons of waste per day, of which 1,478 tons (59.5%) is taken to the final deposit site. The same source states that 84.5 tons (3.7%) is handled by waste-collectors (and the remaining 37.1% of the waste is left 'untreated', that is, ends up in rivers, along railway lines, is burnt or disposed of in some other way). Jambeck et al. (2015) estimate that 11% of the solid waste in Indonesia consists of plastics and this percentage is confirmed in two local studies in Surabaya (Kurniawan et al. 2013: 45; Dhokhikah 2016) and another study found that the share of plastics in the waste deposited at the landfill was 7.7% (Meilasari 2013). If these estimates are accurate, and if the difference between the plastic share at source and at the landfill is wholly caused by waste picking, 30% of the plastics are taken out of the stream and recycled. Judianti (2007) gives higher percentages of recycled plastics; Judianti found that at seven temporary deposit sites on average 40% of the weight of plastics was sorted out for resale by waste-pickers, but also estimated that 25% of the plastics in the household waste had already been sorted out (presumably mostly by the households themselves) before the waste reached the temporary collection sites. The various measurements give a very rough estimate of how much recyclable plastic is taken out of the waste stream and offered to factories in Surabaya. The estimates are rough because of unreliable measurements and also because Surabaya is not a closed system and untreated plastic waste can be imported and exported.

The Economics of the Recyclable Plastics Supply Chain in Surabaya

Crang et al. (2013: 13) remark that in the business of recyclables, value is not added up the chain, but 'extracted' and this extraction is linked to the material properties of the end-of-life products. The materiality of the waste is not homogeneous and the realization of value capitalizes on this heterogeneity of materials. 'To extract values requires increasingly fine-grained sorting' and the skill to distinguish types of waste 'is closely guarded as it is the basis for profitable revaluing' (Crang et al. 2013: 18). Sorting waste is indeed a skill; when I was in a shed in which labourers working for a junk-dealer were sorting out plastics into about 18 different baskets, I was unable to tell one from the other.

The kind of value added in a recycle chain is somewhat different from adding value to a product which moves up a normal global value chain, in which different resources are put together into components in successive steps, which ultimately results in the final object like a cell phone or processed food. In a recycling chain, in contrast, value is added not by assembly, but the opposite activity, separation or sorting. Sorting out waste into more fine-grained categories makes the waste more valuable. When goods are recycled, they are not moved back down the supply chain (or what is called a reversed value chain), but moved forward, adding a new kind of value to it. Recycling some resource from a product is merely the next stage in the 'biography of things' (Kopytoff 1986).

Although the sorting into finer categories is the most important added value in a recycle chain, it is not the only activity. Cleaning the waste also adds value. At one point in the chain I observed men whose only task was to tear up plastic bags so that rubbish would fall out and the shredded bags could be more easily washed in the next stage. The added value was minimal (as was the pay), but, however small, the men did add some value to the plastics.

The activity of sorting out waste into ever more refined categories must be completed with a mirror process of flows of waste coming together in ever larger volumes of a particular category. This role of a collector, amassing larger volumes, is the opposite of that of a distributor in a regular supply chain.

The two tasks of sorting out waste into more refined categories and amassing larger volumes of a specialized resource are often in one hand. This begins with the people who collect waste door-to-door in the neighbourhoods and are also the first to do sorting into broad categories of waste. At the next link in the chain, junk-dealers buy up the broad categories that the waste-collectors have sorted out, but they also employ labourers to perform a more fine-grained selection. Ghisellini, Cialani and Ulgiati (2016: 19) use the terms 'scavengers' and 'decomposers' and Tsing (2009: 169) speaks of 'pluckers', 'buyers' and 'bulkers' (in the wild mushroom business) to describe some of these roles, but I think we would need a much larger vocabulary if we wanted to describe all the roles I encountered in the field properly.

The shortest route of a piece of plastic, say a plastic bottle, would be from a waste-picker (*pemulung*) who plucks it out of the waste to a junk-dealer (*pengepul*), who sells the product to a grinder (*penggiling*), who delivers the snippets of plastic to a factory which processes them into plastic pellets. These are eventually sold to a company which makes a new plastic product. In practice this hypothetical chain, already composed of five different actors, will almost never operate in the way described. Usually junk-dealers trade among themselves, exchanging products for those in which each of them is specialized. There are also several steps from small to bigger junk-dealers. Factories which produce pellets are therefore far removed from the 'dirty' work of the waste-pickers and the labourers of the junk-dealer who select the waste.

One actor can combine several roles. Pak Sarban is a good example of such a multi-tasker.[1] I had found his address on the Internet and, after exchanging several emails, we made an appointment. Standing in front of his company I began to have some qualms, because the entrance was one in a row of small shops and his seemed abandoned. A friend who had accompanied me took out his cell-phone and called him, after which fortunately the door opened. Behind the very unassuming entrance lay an office and three halls of various sizes in which plastics were stored and processed. Pak Sarban's father had begun the business as a junk-dealer and followed the example of

some other junk-dealers who ground the plastics they collected themselves. Pak Sarban had kept the business going after his father passed away.

Pak Sarban's core business is the production of pellets from plastic bags (*kresek*). The machines are operated manually. The plastic bags are thrown into a machine which heats the material and draws it out into long plastic threads which are cooled in an elongated bath filled with water. After this bath the 'spaghetti' is cut into pellets. Pak Sarban stated that 90% of his earnings come from the production of pellets, and 10% comes from the sale of plastic material he has purchased from junk-dealers but cannot use himself. However, the bulk of his material, 70%, no longer comes from junk-dealers, but consists of packaging material he buys directly from other companies. His work is not restricted to trading in plastics, but also includes the fine-grained sorting which is normally done by a junk-dealer: when I visited the plant two women were tearing tape off plastic, hence tackling the sorting of materials which is usually done at an earlier stage in the chain. Pak Sarban has three jobs, he produces pellets, sorts waste and deals in plastic waste.

Crang et al. (2013: 13, 15) assert that the supply of end-of-life products from which resources can be extracted is relatively inelastic. A high demand for recyclables does not quickly lead to a larger supply. The 'impetus is generally from someone getting rid of existing, unwanted stuff. In other words, supply comes before demand'. While this assertion is correct for used clothing and perhaps for paper, cardboard and glass, the situation with plastics is different, as was first explained to me in detail by Pak Nordin.

Pak Nordin produces large plastic objects, like water barrels, dust bins and kayaks, for which he always uses a mixture of plastics made from crude oil and recycled plastics. If he were to make the objects from new plastic only, the cost would be prohibitive but he is limited to a maximum of 50% of the cheaper recycled plastic, as this material is more inelastic and brittle. When I interviewed him in March 2016, a time when oil prices were low, he used 90% original plastic, but when we met again in February 2017, he was using a 50/50 mix.

It goes without saying that the price of recycled plastic pellets must always be lower than the plastic made from crude oil. The price of recycled plastic is determined by neither supply nor demand, but by the price of the alternative – new plastic. Pak Nordin says that the usual price difference of his resources is IDR 5,000/kg, but, when oil was at a low in early 2017 and consequently new plastic was very cheap, the price of recycled plastic could not maintain the difference of Rp 5000/kg necessary to remain competitive. At the time Pak Nordin was paying Rp IDR 18,500/kg and IDR 17,500/kg for new and recycled plastic respectively. A marketing executive of one of the biggest producers of recycled plastics, interviewed in the same week, was still mentioning a price difference of IDR 3,000 kg for PP (Polypropylene) but she also said that the price had fallen (*harga jatuh*). Two informants told me that the production of recycled plastic had been scaled down, but a shortage would not push up the price again as long as oil was cheap. Waste-pickers down the supply chain must have been thrown out of work or switched to other recyclables. Producers of recycled plastics have few means to protect themselves against the low oil price, except by passing the burden on down the supply chain to junk-dealers and waste-pickers. Ironically, the producers of pellets made from recycled plastic are thereby indirectly supported by the competition from virgin plastic to keep the price of recycled plastic down. In a worst-case scenario, a falling global oil price could ultimately bring the production of recycled plastics to a halt.

Pak Riki is marketing manager of a company producing large bags (containing up to 50 kg) sporting printed texts or images ordered by customers. In 2009 it experimented with recycled plastic as a resource as its competitors were using this cheaper source. They used only plastics obtained from water bottles, the cleanest possible source. They were forced to switch back to new plastic because the quality of the recycled plastic was inferior and the plastic was also polluted. So much so that machines needed to be cleaned three times a day, which slowed down operation, and yet the quality of the bags deteriorated. According to Pak Riki, producers of recycled plastic should either add an ingredient to refine the plastic or use a filter, but the additive would increase costs and a filter reduces the level of production. Pak Nordin also commented on the lower quality of recycled plastic; suppliers could not always guarantee they could deliver produce to specification.

The Recyclable Plastics Supply Chain and the Movement of Waste

Most studies of global value chains take a unidirectional flow between the global North and Global South for granted. Production takes place in the South, consumption in the North and the most profitable activities in marketing and company strategies take place in the North. The chain ends with the consumption of the goods produced and end-of-life goods become waste. Crang et al. (2013: 14) challenge this basic assumption and make the point that the presumed end of the supply chain is the beginning of a new chain of recyclables. They are intrigued that the global recycle chain not only reverses the direction of trade, but also literally disassembles products. In terms of volume, trade in waste is the biggest flow from North to South (Crang et al. 2013: 12; Gregson and Crang 2015: 153, 160).

While the notion of value chains, supply chains or recycle chains is useful, the debate about whether flows go North-South or vice-versa with concomitant ideas about Northern hegemony are irrelevant to my story. Producers of recyclable plastics use whatever material they can use for a good price, regardless of their origin. Pak Nordin, the owner of a factory producing large plastic objects, once purchased a large load of recycled plastic from Dubai, Brazil and South Korea when it was offered at a low price, but did not find either the purchase or the quality different from plastics from Indonesian sources. A similar point was made by a manager of a factory producing cardboard from recycled paper, who purchased material from local suppliers in distant places in Indonesia, the Middle East

and Europe. Quality differences were marginal and also in cheating by wetting the paper to make it heavier the local suppliers were just as bad as the Europeans.

The waste chain in Surabaya differs from other studies of global value chains of recyclables. The waste I am discussing is usually not a consumption good used in the North and disassembled in the South, like cell phones, computers and televisions. The bulk is made up of simple, locally produced items: organic waste, paper, cans, plastic bottles and countless plastic bags (*kresek*). It is a relatively small step from end-of-life product to usable resource, much shorter than dismantling a computer.

Gereffi, Humphrey and Sturgeon (2005: 80) have observed that the disintegration of localized production and the emergence of global supply chains kept pace with the increased globalization of trade. From this point of view, the mobility of goods (and workers, finance, technology, standards) is a prerequisite for the smooth operation of a value chain. I argue that, in the handling of recyclables, the movement is not only a prerequisite, it is an essential part of the added value. Household waste needs to be sorted out if it is to accrue value as a resource and this sorting out *must* be done by moving it to a new place.

The factories producing pellets only do business with large suppliers, delivering at least 1 or 2 tons of recyclable plastics at a time. Pak Sarban, who produces pellets from old plastic bags, deals with about 40 junk-dealers who sell from 1 to 20 tons of material per month, but the price varies with the volume: the bigger the volume offered to him, the more willing he is to pay per kilogram. He increased the price of IDR 7,000/kg for clean polypropylene (PP) plastic bottles to IDR 500–1,000/kg for larger volumes, a 7–14% price difference. It is not worth the trouble for a small junk-dealer living at some distance to transport a small quantity over the long distance to Pak Sarban's factory, because he or she will get a low price. This junk-dealer will find it more profitable to sell his or her product locally to a larger junk-dealer who has the wherewithal to transport larger volumes over a longer distance. This larger junk-dealer will still make a profit despite the cost of transportation, because Pak Sarban will be willing to pay him a higher price. Interestingly Pak Sarban himself was well aware of the supply chain and spoke literally of a '*rantai chain*'.[2]

The recyclables supply chain connects formal and informal sector activities. Below we shall see how the factories operating in the formal sector profit from the connection with informal entrepreneurs, but the connection between formal and informal sector activities is not without its hitches. A producer pays the government VAT, but in a formal economy passes on part of the tax burden to its suppliers and only pays tax for the value added by him- or herself. The big companies at the end of the recycling chain cannot do this, because the grinders or junk-dealers who supply them operate informally and do not pay VAT, so the large companies have to bear the full brunt of the taxes. ADUPI, the association of recycled plastic producers, feels that VAT weighs unreasonably heavily on its members and is lobbying for a lower tariff.

Supply Chain Governance

Global value chains all face the challenges that '[I]f production is increasingly fragmented across geographic space and between firms, then how are these fragmented activities coordinated?' (Gereffi, Humphrey and Sturgeon 2005: 80). Gereffi, Humphrey and Sturgeon (2013: 85–86) seem to see this challenge first and foremost as a practical, management problem, for which the solution is contingent on three factors: the complexity of the information and knowledge transfer required; the extent to which the information can be codified; and the capacities of suppliers. Of these three factors, the complexity of information required is above all a technological problem and beyond the scope of this article, but the codification of information and the assessed capacities of suppliers is more a social problem.

The codification of the standard must be done in a manner which can be easily grasped, even by the suppliers not all of whom are perhaps literate. Showing samples of the material is the most common way to codify the standard and I encountered it in three different companies. For instance, at the back of the room in which a producer of recyclable plastics receives his or her visitors, there were over 100 glass jars with samples of the material they accept (snippets of plastics in various colours) and others with samples of the pellets they produce. Their openness about the samples once one has gained access to the premises contrasts with the secrecy surrounding the production site. Although this is the largest producer of recyclable plastics in Surabaya, I drove past it twice missing the entrance each time, because the complex is surrounded by a high wall and gives no indication of what goes on inside it.

Another way an expert can recognize the kind of plastic and its quality is by biting it to test the elasticity. A salesman who worked at a large company's sales point in the city centre had made this a habit. Throughout my interview with him, he was constantly putting pellets between his front teeth. A knife with a groove was arguably his most important piece of equipment. He stuck the knife into bags containing pellets to take a few pellets to show to visitors and subsequently bite on them.

The standard required by the factories is passed on down the recyclables supply chain. A grinder specialized in plastic bottles, purchased, and also went on to sort, material using the plastic types and colours codified by the factories. Blue caps went together with blue caps and red with red. Earlier in the recyclable supply chain, I had observed labourers working for junk-dealers making similar, but less fine-grained divisions.

The codification of standards is no guarantee that traders along the recycling chain will maintain the required standard. Depending on how polluted supplies are, factories making pellets from recycled plastics have a recovery rate from 90% to as low as 50%. If factories want to minimize the loss of useless material, assessing the capacity of suppliers is another factor in supply chain governance.

Assessing the quality of suppliers is unfortunately no easy task and the trade in recyclables offers an 'enormous possibility for opportunism' (Crang et al. 2013: 19). For

well-intentioned entrepreneurs there is always a trade-off between the purity of the materials extracted and the investment in labour and capital required to attain this standard (Gregson and Crang 2015: 167). Unscrupulous suppliers weigh the chances of getting caught, for instance, when they hide polluted plastics at the bottom of a delivery. Aware of their less than honest practices, the companies producing pellets from recyclables and companies using the produce fear fraud. Pak Nordin wished there was an independent audit of producers of recycled pellets, but not enough money circulates in the certification of plastics to warrant an investigation by Corruption Watch.

Three staff members of the biggest producer of recycled plastic were especially worried about plastics obtained from bottles which had contained toxic liquids, such as insecticides and germicides, medicines, or human remains in medical plastics. They claimed there are easy tests, for example, the structure of plastic allegedly changes when a bottle has contained toxic stuff. Now and then they take a sample of the plastic resources offered to them and burn some of it. If the burnt plastic smells noxious, it is assumed to be poisonous. In another test they throw the sample into cold water; if it sinks it is thought to be good, but if it keeps floating the plastic is toxic. Listening to their explanations, I could not help but see a similarity with European witch trials, but perhaps I should not question the reliability of these methods and place trust in their expertise.

In contrast to Gereffi, Humphrey and Sturgeon (2013), for Crang et al. (2013) the study of governance is not a practical management problem, but a matter of unequal power. Crang et al. (2013) and Gregson and Crang (2015: 164–166) conclude that, in global supply chains of consumer items, the lead firms are usually in control, but in recyclable supply chains the actors in the middle of the chain govern the chain. At this point, I want to make a plea that no supposition about the governance of recycle chains should be made beforehand and the question of who is in control of the chain must be studied empirically. On the basis of the codification by samples, my conclusion is that factories producing pellets have the most control over the chain.

Anna Tsing (2009) has reflected on the unequal power relations in what she calls 'supply chain capitalism'. She argues that labourers have been deprived of their previously hard-won rights by two intertwined mechanisms: the role of non-economic social classifications – of which more in the next section – and outsourcing work represented as independent entrepreneurship.

Outsourcing work plays a major role in the plastics recyclable chain in Surabaya. The companies producing pellets make an effort to keep their suppliers at a distance. Deliveries of material are paid on the spot in cash and no permanent relationship is developed by the exchange of credit or bank transfers. Buyers and sellers of deliveries often do not know each other's name.

The control over the supply chain is also apparent in the limited number of suppliers with whom the factories want to deal. They only accept resources in large quantities, forcing suppliers to extend the waste-recycle chain to larger entrepreneurs who buy up the supplies of small junk-dealers. Factories simply refuse small quantities point blank or pay a lower price per unit weight for small quantities.

A corollary of the outsourcing is that the big companies producing pellets do not seem to care much about the problems of their suppliers. Their lack of commitment is demonstrated by the stories of two grinders who were misled by their own suppliers. The first grinder went bankrupt when a neighbour who transported two truckloads of ground recyclable plastic to a factory ran away with the money. The other grinder suffered the same fate when a factory rejected his delivery. He had purchased the material and checked the top layer, but his supplier had concealed dirty material underneath. The capability of suppliers had already been mentioned by Gereffi, Humphrey and Sturgeon (2013) as one factor in a successful recyclables supply chain, but there is no objective measurement of their capacity. The pitiless treatment of the grinders shows that it is the factories which have the power to decide who is called 'capable' and who is 'incapable'.

Anna Tsing (2009: 148) makes the point that, even though various enterprises are disciplined within a supply chain, the autonomy of ostensibly independent entrepreneurs has been legally established. When suppliers have learned to think of themselves as independent risk-takers rather than labourers, the supply chain can lead to 'super-exploitation' (Tsing 2009: 148, 167). This fiction of independent entrepreneurs in Surabaya is clearly visible near the beginning of the supply chain. Waste-pickers at the landfill mention their freedom as an important reason they have chosen this work. They often contrast work as a waste-picker with a former job in a factory in which they had to work by the clock and obey a boss. At the landfill, however, they are actually tied to the collector who gives them an advance payment which must be repaid in kind, so they can hardly be called independent entrepreneurs. Whether this fiction of independent entrepreneurship must also be called a case of super-exploitation depends on the operationalization of the term exploitation. Is living in misery a necessary condition to say that somebody is super-exploited? Waste-pickers lead better lives than the mass media usually suggest and I would not call them 'exploited'.

The fiction of independent entrepreneurship suits the factories very well. Referring to Wal-Mart as an exemplary case of capitalist supply chains, Tsing (2009: 156) has demonstrated that the company does not want to control either the labour arrangements or the environmental practices of its sub-contractors. Moreover, even 'the most "socially conscious" firms are able to claim that, despite their best efforts, they are unable to force compliance with their own high ethical standards' (Tsing 2009: 163). This argument can be applied just as appropriately to the recyclables supply chain as to Wal-Mart. The factories find it convenient not to have too detailed a knowledge about how the grinders, junk-dealers and waste-pickers operate. If the factories were to wash the plastics before using them, the costs of the waste water treatment would be

prohibitively high from a business perspective. A grinder in a village can discharge the waste water into a river without treatment or, when a grinder does have a sink tank to clean waste water, the slush is used to raise the level of agricultural fields, so the pollution ends up in nature after all. Pak Jacky, who owns a large factory producing pellets from recycled material, thinks that the grinders are 'naughty' (*nakal*) and also the government turns a blind eye to what is happening to protect employment opportunities. Pak Jacky himself is happy to buy the cheap material from the grinders and drily observes that they are 'businessmen, not environmentalists'.

The different forms of supply chain governance all benefit the factories at the end of the chain. They maintain control over the chain by the codification of standards and by their power to determine which grinder or junk-dealer is competent and which is not. Through the outsourcing of the collection and sorting of waste they have increased their own invisibility and have successfully distanced themselves from activities which are socially disapproved of. Keeping a distance from the suppliers who imagine themselves to be independent entrepreneurs opens the door for the super-exploitation of the waste-pickers and junk-dealers.

The Public Imagery of Recyclable Plastics

Anna Tsing has argued that the super-exploitation of purportedly independent entrepreneurs is most likely to occur when people who occupy particular niches in a supply chain are defined by intersecting '"noneconomic" arrangements of gender, race, ethnicity, nationality, religion, sexuality, age, and citizenship status'. Super-exploitation depends by definition on these non-economic factors and is then 'greater than might be expected from [purely] general economic principles' (Tsing 2009: 158).

This sort of non-economic hierarchy which disciplines the labour force in a recyclables supply chain is absent from waste management in Surabaya. The waste-pickers and labourers working for junk-dealers are no different from the people higher up the chain in terms of ethnicity, nationality, religion, citizenship or age. Although males might dominate the higher echelons, the early stages in the supply chain are occupied by men and women in equal numbers. Actually, waste-picking is remarkably gender neutral and waste-picking is often done by married couples.

However, in one aspect the people handling waste are singled out and stigmatized: their work is polluted in the sense used by Mary Douglas (1966). Recycled plastic is polluting and the people processing the waste are by extension also symbolically polluted. More than once, managers of the factories who offered me something to drink refused to drink through a plastic straw, a common habit in Indonesia, afraid that the straw had been made from something contaminated (medical waste or faeces). Conversely, plastic which is made from crude oil is called '*plastik murni*' (pure plastic, or unadulterated plastic), and the English expression '*virgin plastic*' is also used for plastic made from oil.

When even the people who produce plastic from recycled material harbour such a negative attitude, it is hardly surprising that recycled plastic has a low status in society at large. Remarkably, several of my interlocutors switched to English to make this point in sentences like: 'The [Indonesian] customer doesn't care [about being] eco-friendly'. Contrary to the global North where people are willing to pay extra for an object made from recycled materials, the source of the material is not a selling point in Indonesia. As one manager of a company producing pellets explained to me: when consumers see the international symbol for recycled material (three arrows forming the sides of an equilateral triangle), they immediately assume the object is of poor quality. Environmentally concerned consumers who do feel positively about recycling still refuse to pay extra, because they assume that the producer using the icon has cheated and misappropriated the symbol. In such a public environment, the recycled nature of the consumer items is better hidden from the public eye. As Pak Nordin concluded: 'Producers of plastic objects lie a little' (*industri bohong sedikit*) about the use of recycled plastic; and the consumers want cheap articles and 'do not want to know' (*konsumen tidak ingin tahu*) about the recycled origin of the material.

Although one staff member of a factory confided that she would rather work in the recycling business than for a logging company destroying the forests, on the whole such idealistic motivations were few and far between in the recycling industry. Sometimes, however, producers do voice environmental concerns, but only for their own benefit and less out of conviction. For instance, the PT Sumber Plastik factory has adapted the international symbol for recycling as its company logo. The biggest producer of pellets made from recycled plastics in Surabaya uses English language brochures and promo films to attract international clients and in these it does emphasize the positive environmental impact of recycling. Their contribution to a circular economy has also been used in a lobby to the Indonesian government to lower taxes for these factories. The few examples that the positive environmental effect of recycling is mentioned do not counter the general negative attitude of both recycled materials and the people handling the recyclable waste.

Conclusion

Indonesian factories producing pellets from recycled plastic have deliberately kept a low profile. Their paradoxical conspicuous invisibility is made possible by a long supply chain. The negative stigma attached to recycled plastic in Indonesia is directed away from the factories and falls on the waste-pickers (*pemulung*), and to a lesser degree the junk-dealers (*pengepul*) and grinders who get their hands dirty with the waste from which the recycled plastic is selected. Factories distance themselves from their suppliers: only a limited number of junk-dealers and grinders are allowed to penetrate the factory gate. The selective access to the factories forces small junk-dealers to sell their supplies to larger junk-dealers, usually in several steps, and consequently the recyclables supply chain grows longer and the connection between the company producing pellets and the waste at source is ever more obscured. Such obfuscation of connections between the

far ends of a supply chain is probably true of neoliberal supply chains in all kinds of businesses.

Not only does the distance from the source allow the factories to shake off the opprobrium of working with waste, they also do not need to know ("cannot know") what goes on earlier in the supply chain. They cannot be held responsible for possible environmental or social errors, like the cleaning of plastics without adequate waste water treatment, the recycling of medical plastics or the low pay and monotonous work of labourers working for junk-dealers, but nevertheless the factories do profit from these 'errors' because of the low price of recycled plastics.

The different actors in the recycling business form an extremely complicated network over which nobody has a full oversight. The term 'supply network' would be more appropriate than the commonly used term 'supply chain'. The factories maintain control over this supply chain by the setting of the standard of the material they accept and by their power to declare which supplier is capable and which one is not. The factories are helped in their subterfuge by the fact that they do not need to negotiate a price determined by supply and demand, because the price for recycled plastics is set by a factor external to the recycling business: the international oil price.

Although nobody has a full oversight of the complete recycling value chain, waste-pickers, junk-dealers, grinders and pellet factories, the government and consumers do have one common habitus: they do not want to know (*tidak ingin tahu*) what exactly goes on in recycling. Although it would be going too far to speak of a conspiracy of silence, the conspicuous invisibility of the recycling industry is certainly convenient to everybody in the short run.

In the long run, however, more openness would be good for all sides. The social status of the waste-pickers could be improved, and their work is the first essential step in the recycling chain. Poor labour conditions (especially among the labourers working for junk-dealers) and polluting production techniques (especially among grinders who discharge waste water without proper treatment) could be better controlled, as could the labour and production conditions in the factories producing pellets. The quality of the recycled plastic could be better guaranteed from source to the end product of pellets and fraud would be cut. Most importantly, when the quality improves and if consumers are better informed, recycled plastics will no longer be a cheap but hidden alternative of virgin plastic, but can become an eco-friendly product, which attracts its own demand. Even the factories producing pellets from recycled plastic would profit from such openness.

Notes

[1] Pak and Bu are Indonesian honorific titles, meaning 'Sir' and 'Madam'; all names are pseudonyms.

[2] A pleonasm; *rantai* is Indonesian for chain.

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