

Yvan Schulz

Scrapping ‘Irregulars’: China’s Recycling Policies, Development Ethos and Peasants Turned Entrepreneurs

Abstract Nowadays, ‘e-waste’, or discarded electrical and electronic equipment (DEEE), is synonymous with environmental degradation and global injustice. In China, the central government has come up with a series of regulations and policies in recent years to deal with the challenge posed by both foreign and domestic DEEE. It justified this programme by invoking the necessity to protect China’s environment. This article shows how Beijing’s efforts to ‘formalise’ DEEE collection and recycling concentrate activities in the hands of a limited number of large companies, and cause the exclusion of a myriad of actors and entities, in particular self-made entrepreneurs with roots in the Chinese countryside.

Keywords e-waste, recycling, informal sector, exclusion, China

1. Introduction

Few types of waste epitomise global inequalities better than ‘e-waste’. Over the last two decades, activists, researchers and journalists, among others, have been denouncing the dumping of old, used and defunct devices such as television sets, mobile phones and computers from the Global North onto the Global South (see, e.g. Puckett et al. 2002; Brigden et al. 2005; Grossman 2007). Their accounts describe the pollution caused by basic recycling operations in poor regions of Asia and Africa, and stress that people living there pay the price for the affluent lifestyles of others. As a result, ‘e-waste’ — which will be referred to in this article as discarded electrical and electronic equipment (DEEE), to avoid the presumption that these products have reached the end of their useful ‘life’ — has become largely synonymous with environmental degradation and global injustice.

China holds a central place in this narrative. At least up until a few years ago, the country was receiving such large quantities of DEEE from abroad that a team of researchers led by the United Nations University labelled it the “largest e-waste dumping site in the world” (Wang et al. 2013). Officially, a ban on DEEE imports has been in place in China since the early 2000s. Enforcement, however, only begun in earnest during the 2010s, when the Chinese central government shifted to a more restrictive policy on waste imports in general, adopting stricter rules, improving implementation, and tightening controls in this domain, as evidenced by operations Green Fence (*lǐlǐ*) and National Sword (*guómen lìjiàn*), among other official measures. This trend culminated in the announcement, in July 2017, of a ban on imports of 24 types of scrap material (MEP 2017)ⁱ, which made international headlines. The ban posed a serious challenge for many foreign recycling companies, including in Western Europe and North America, where business models relied considerably on shipping recyclable waste to China. It also brought out the global scale, division of labour and interdependence that characterise contemporary scrap recycling (Liebman 2018).

At first glance, the Chinese government's increasingly restrictive stance on waste imports can be read as an attempt to put an end to a globalised inequality of which Chinese people are the **victims**. This is consistent with the official rhetoric in China that denounces 'foreign waste' (*yang laji*) as dirty and dangerous, portrays the Party-state as a champion of 'environmental protection' (*huanbao*), and emphasises its capacity at safeguarding national sovereignty and defending the interests of the Chinese people. A more thorough analysis, however, reveals that there is more at stake than freedom from waste domination — although this is a symbolically powerful message in the context of China's growing clout and assertiveness in the international arena. Restrictions on waste imports are part of a broader revamping of China's waste collection and recycling sector that has been going on for many years — indeed, for more than a decade if we look at DEEE. Together with other recent policy changes, they point to a more general endeavour on the part of the central government that consists in modernising waste collection and recycling in China (see, e.g., Schulz 2015 and 2018).

According to official discourse, this state project of modernisation is meant mainly to reduce the environmental impact of 'e-waste' (*dianzi feiqiwu*), notably by improving pollution control. But what are its other effects, in particular its more questionable ones? In a political ecology approach, what are "the contradictions, the ironies, the winners and losers, and the simultaneously real and represented nature of the world" (Robins 2004: 252) that we can identify as being intrinsic to this project?

In this article, I argue that the modernising drive leaves little room for the kinds of social actors and economic entities that have been at the forefront of waste collection and recycling in China for the last three to four decades, namely micro and small enterprises, family businesses and self-employed workers (also known in China as 'individual businesses' or *geti gongshanghu*, abbreviated *getihu*)ⁱⁱ (see also Goldstein 2006 and forthcoming, Lora-Wainwright 2016; Schulz/Steuer 2017). By calling for the end of informality in all things waste-related, it makes it difficult, indeed sometimes impossible, for the latter to continue operating. Seen from this angle, 'formalisation' (*zhengguihua*), as the modernisation of waste collection and recycling is commonly referred to in China, constitutes a fundamentally exclusionary policy, whose impact has been felt sharply by those who live off the trade, transport and transformation of scrap. People of rural origin (peasants turned entrepreneurs, migrant workers, their offspring), who form the bulk of this population, have been hit particularly badly. In other words, the central government's efforts to put an end to environmental degradation in China and to elevate the country from its subordinate status in the global industrial pecking order come at a high price, as they deprive millions of people who either own or work for an individual business from their livelihood.

At the same time, formalisation has been slow in the making and remains incomplete to this day. If we look at DEEE collection and recycling, actors and entities labelled 'informal' (*fei zhenggui*) continue to deliver crucial services, which not only the general population, but also 'large companies' (*da qiye*) and state authorities have come to rely on. Likewise, China's new regulatory system for DEEE collection and recycling would not function nearly as well if *getihu* were to disappear completely and with them their organisational modes and business models (see Chen 2006) — though, ironically, those are precisely what the system has been devised to replace (see Scott 1998).

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This article is divided into three sections. The first one provides background information on the historical evolution of waste collection and recycling in contemporary China. Section two focuses on DEEE and analyses the state project of formalisation. A third and final section looks at the impact of formalisation on the ground for the people involved in DEEE collection and recycling, and relies on two case studies: one on rural recycling hubs specialised in DEEE dismantling and processing, the other on urban networks specialised in DEEE collection. The data that informs this article has been produced through ethnographic fieldwork that I conducted in Guangdong Province and other parts of China for a total of 18 months between 2014 and 2016.

2. Dealing with waste in contemporary China

In keeping with a classical approach to China's history, the evolution of waste collection and recycling in Chinese cities during the twentieth century can be divided into a Republican (1911-1949), a Maoist (1949-1976), and a reform era (1976-2013ⁱⁱⁱ) (Goldstein forthcoming). Each of those eras has specific features, or a distinctive waste regime (see Gille 2007: 34). For the purpose of this article, we need to go back only to the Maoist era, and only briefly; what matters most are the changes that took place during the era of economic reforms (*gaige kaifang*).

After the revolution of 1949, China's new Communist government brought waste collection and recycling under state control and made this domain an integral part of the planned economy (Goldstein 2006 and forthcoming). The Communists put the highly diverse network of scrappers, pickers and handicraft workers that had characterised the Republican era (see Dong 2003 on Beijing) under government management and disciplined the resident population. Citizens were encouraged through state propaganda to contribute to what was framed as a nation-wide effort towards efficient resource use by being thrifty, sorting their recyclables, and bringing them to government-run recycling shop. They were also incentivised by the fact that the government bought back recyclables.

Things changed drastically from the late 1970s onwards. At that time China entered an era of market reforms that opened up many sectors of the economy to private enterprises, thereby unleashing productive forces and triggering unprecedented growth. Industrialisation, urbanisation and the advent of mass consumption resulted in an explosion of municipal solid waste throughout China, which led the World Bank to state that "no country has ever experienced as large, or as rapid, an increase in waste generation" (World Bank 2005: 1). In all major Chinese cities, municipal recycling companies were challenged, and eventually all but replaced, by a multitude of highly motivated rural migrants, who became the main characters in Chinese scrap collection and recycling (Li 2002; Ensmenger et al. 2005). In Beijing, the state's recycling net dissolved, mainly due to the combined effect of mushrooming amounts of municipal solid waste and plummeting prices for recyclables. The municipal recycling company began to concentrate exclusively on industrial metals, which require little labour and yield high profits, and to abandon household waste. This created a vacuum, which was quickly filled by people willing to work much harder and for less money than state employees (Goldstein 2006).

Commented [A2]: Sorry to disagree with this one. On the question of whether "data" is plural or singular, I'd rather follow the majority of native speakers, not the minority of latinophiles and linguistic purists. That's what The Guardian does as well (see <https://www.theguardian.com/news/datablog/2010/jul/16/data-plural-singular>). According to their language policy: "Data takes a singular verb (like agenda), though strictly a plural; no one ever uses 'agendum' or 'datum'" (emphasis added).

Commented [A3]: 'Or', not 'and', because these 'specific features' make up a 'waste regime', as Gille defines it.

Commented [A4]: 'Incentivised', with a V, was correct. 'Incentised', with an S, isn't.

China's growing trash heap proved a bonanza for newcomers: it provided a livelihood for many of the people who had left the countryside in hope of finding a better life in a large city. Through exploiting waste, millions of migrants managed to lift themselves out of poverty; a few of them even made a fortune. At the same time, competition was fierce, and migrants' illegal status made them extremely vulnerable. As urbanites possessing only a rural residential permit (*hukou*), they faced discriminatory regulations and repressive state practices (Solinger 1999). Urban sprawl also forced scrapyards communities populated by migrants to regularly move further away from the centre, towards ever more remote city outskirts (Tong/Tao 2016).

With domestic demand for raw materials constantly on the rise, many self-made entrepreneurs with origins in the Chinese countryside started to source scrap from abroad. China became the world's largest scrap importer (Minter 2013; Goldstein 2012). During the first decade of the twenty-first century, scrap and waste accounted for the largest share, in both weight and value, of imports from the United States. Several towns, among which Guiyu in Guangdong Province (see Lora-Wainwright 2016, 2017), Taizhou in Zhejiang Province (see Tong/Wang 2004) and Wen'an in Hebei Province (see Goldstein 2016), morphed into specialised rural recycling hubs that thrived on a mixture of foreign and domestic scrap, and catered for the needs of the Chinese industry. In most cases, these recycling hubs were located in poor rural areas, but close to both the sea and large industrialised regions, which made them ideal spots in terms of labour, land and transportation costs.

With time, the downsides of China's meteoric industrial take-off became increasingly problematic and obvious. Severe environmental degradation, in particular, emerged as a serious cause of concern and a problem requiring prompt intervention (Economy 2010). Waste-related issues (e.g. dumping, landfilling, incineration) increasingly came under the spotlight; recycling was no exception (see, e.g., Wang 2012 and 2016). On a global level, salvaging materials limited pollution and maximised resource utilisation, but on a local level, in China, breaking down waste created severe forms of pollution (Minter 2013). In the 2000s, rural recycling hubs located along the coast of China, including Guiyu, Taizhou and Wen'an, started receiving much negative publicity as highly contaminated places. The emergence of these pollution scandals can be partly explained by dominant representations in China, according to which the countryside is backward, dirty and disorganised (Lai 2016).

In the early years of the twenty-first century, the Chinese state started to reassert its control over the recycling sector. In Beijing, for instance, various district branches of the municipal recycling company made proposals for rebuilding the municipal government's recycling network (Ensmenger et al. 2005). A "new nationalist environmentalism", as Goldstein calls it, informed this push for change. Rural migrants involved in waste collection and recycling became less and less tolerated by officials and civil servants. They were criticised for being 'of lower moral quality' (*suzhi di*) and 'not environmentally friendly' (*bu huanbao*) (Goldstein 2006: 290 and 286f.), and numerous crackdowns targeted them, especially in the run-up to the 2008 Olympic Games (Goldstein forthcoming).

A similar dynamic can be observed with regard to DEEE collection and recycling. The sector remained virtually unregulated for most of the reform era, until the central government began to intervene in the 2000s by adopting laws and setting up pilot projects (see Schulz/Steuer 2017). Environmentalism served as the main official justification for these

efforts. The Chinese national policy on DEEE collection and recycling left no room for *getihu*, who had dominated the sector until then. It aimed at driving them out and replacing them with corporations capable of running large, capital-intensive and partly automated plants.

3. The formalisation of DEEE collection and recycling

In official parlance, the revamp of DEEE collection and recycling in China is often referred to as ‘formalisation’ (*zhengguihua*). Under that banner, experts such as academic researchers, engineers, company representatives, state officials and environmental activists^{iv} advocate a transformation that can be itemised as follows (Schulz 2016). First, formalisation involves ‘systemisation’ (*zhiduhua*): the elements that make up the DEEE collection and recycling sector need to be assembled into, to function as, and to be easily recognisable as an organised whole. Second, formalisation requires making sure that DEEE collection and recycling ‘conforms to rules’ (*hegui*), by which is meant explicit, written rules such as those anchored in regulations, authorisations and certifications. A third essential component is ‘standardisation’ (*biaozhunhua*), namely the idea that China should strive to attain ‘international standards’ (*guoji biaoqun*) — which is really another way of saying catch up with ‘developed countries’ (*fada guojia*). Finally, formalisation involves ‘industrialisation’ (*chanyehua*) and ‘scaling up’ (*guimohua*): DEEE collection and recycling should rely on large and specialised establishments that use complex machinery, mechanised processes and disassembly lines, and have the capacity to handle a substantial volume of goods. The adoption of the factory system also means that industrialists, and not workers, plan the working schedule and own the means of production.

In China, the formalisation of DEEE collection and recycling began more than a decade ago and started to deliver visible results from the late 2000s onwards (Schulz 2015; Schulz/Steuer 2017). A ban on imports of DEEE dates as far back as 2000 but enforcement remained weak until the early 2010s. As regards domestically generated DEEE, experience gathered during the 2000s through pilot projects and first regulatory efforts led to the adoption in 2009 of a key legal text, the *Regulations regarding the administration of the recovery and disposal of waste electrical and electronic products* (hereafter the Regulations, State Council 2009, effective since 2011). This text states that dismantling and processing must take place in a limited number of large facilities rather than in a multitude of small ones (art. 5 on ‘concentration of treatment’ or *jizhong chuli*), and that licensed plants are free to supply DEEE from any source (art. 34 on ‘multi-channel collection’ or *duo qudao huishou*). The Regulations also introduced the principle of extended producer responsibility: producers, i.e. companies selling electrical and electronic equipment, are required to pay a recycling fee on each item they put on the Chinese market; this money is collected by the central government and redistributed in the form of subsidies to a network of licensed recycling plants spanning the whole national territory. In 2015, China had 109 such plants, which together dismantled, and in some cases pre-processed, 75 million items, almost twice as many as in 2013 (CHEARI 2016).

The introduction of the financing mechanism led to a significant increase in volumes but at the same time the new system displayed a number of serious shortcomings. It did not entirely solve the old problem of lack of supply: licensed recycling plants continued to operate much below their full capacity, estimated at 150 million items in 2015 (21st Century Economic Report 2017); and it also created new problems: plants were incentivised to ‘feed on subsidies’ (*chi butie*) rather than rely on the economic value of recovered materials to generate revenue. In addition, the DEEE recycling fund ran a very large deficit (2.7 billion RMB in 2015, or half of the total sum allocated to licensed recycling plants), which was likely to grow with time (CHEARI 2016, 21st Century Economic Report 2017).

As a state-run system, China’s new official system for ‘e-waste management’ (*dianzi dianqi feiqiwu guanli*) is characterised by considerable bureaucratic complexity (Someno/Miao 2016). No less than eight ministries are officially involved (Wang et al. 2013: 40), which creates red tape and uncertainty. One Chinese businessman I interviewed, who traded scrap on a global scale, told me that he had no intention whatsoever of establishing a DEEE recycling plant in China, and justified his reluctance by saying that: “What the Ministry of Environmental Protection says [*zhiding*] counts as law; what the Customs says also counts as law; and what the Ministry of Commerce says counts as law too!” Other people I interviewed, who had first-hand experience of the system, criticised it for being opaque and hard to understand and navigate. Proximity to the Chinese state presumably makes it easier for certain enterprises: many of the flagship and largest licensed recycling plants belong to state-owned groups (e.g. Gree, TCL, Changhong), or came into being through public-private partnerships and enjoy support from a provincial or municipal government.

By and large, the Chinese official e-waste management system is a product of top-down governance (Schulz/Steuer 2017). The central government took all important decisions and paid little attention to local realities and regional particularities. Experimentation did take place at the local level during the mid-2000s, and Beijing took into account the outcome of pilot projects while devising China’s first nationwide policies on domestic DEEE, but the idea was not at all to build from the ground up. Tellingly, Chinese researchers focused their efforts on studying the policies, regulations and techniques that developed countries such as the US, Japan and Germany had come up with to tackle the issue of DEEE, and on imitating them, or at least finding ways to transpose them into the Chinese context. Very few of them spent any amount of time going to the field, in their own country, to observe existing networks, flows, practices and protagonists. Fei et al. 2016, for instance, remains an exception, which the authors explicitly acknowledge. In an interview, an environmental scientist at the Chinese Academy of Sciences who has conducted this kind of research told me: “I did it only as a side project, a small one at that, because in China you don’t get any funds for this.” As a result, one could observe a serious lack of knowledge and understanding among Chinese institutional experts regarding what existed before the regulatory system or still exists today in parallel with that system.

One could reasonably argue that the type of DEEE collection and recycling that dominated in China in the 2000s could have been improved, e.g. by making certain practices less environmentally damaging and better protecting workers, and that there would have been benefits in doing so, e.g. leveraging existing knowledge and preserving livelihoods. Yet, the

experts who contributed to making China's 'e-waste management' system did not pursue this approach, and perhaps never even seriously envisaged it. Instead, they assumed that a revolution was the way forward (Schulz 2015, see also Reddy 2015 and Laser 2016 on India). For them, it was obvious that the practices, places and protagonists of yesterday had to make way for those of tomorrow. This owes a lot to the modernist ideology that suffuses the program of formalisation of DEEE collection and recycling — as well as other components of the Chinese government's broader programme of building an 'ecological civilisation' (*shengtai wenming*). On the surface of things, formalisation **tackles mainly** the problem of pollution caused by DEEE recycling. However, at a deeper level, it aims at solving China's backwardness, real or perceived (see Hubbert 2015).

It is therefore unsurprising that this programme rejects China's *getihu* and what characterises them, namely: petty capitalism, cottage industries, manual labour, object stewardship, lean operations, market mechanisms, ethnic networks and individualised relationships. *Getihu* find it impossible to fulfil official requirements, and therefore to operate lawfully, because China's new 'system' for DEEE collection and recycling has not been designed for them, or with them in mind. As far as DEEE dismantling and processing is concerned, the exclusion of *getihu* represents a deliberate strategy on the part of the central government. As a representative of the Ministry of Environmental Protection explained to me: "We are cracking down on small workshops and using economic methods to promote their competitors. The more big recycling plants there are, the harder it will be for workshops to survive." In other words, with regards to at least one subsector, the central government intervened by distorting competition in order to get rid of *getihu*. Likewise, an important aim pursued through the most recent scrap import ban and earlier measures, such as operations Green Fence and National Sword, was to raise sectorial concentration by pushing small players out.

The language of informality plays a crucial role in this context. Proponents of formalisation regularly refer to actors and entities operating outside of the official system as being 'informal' (*fei zhenggui*). Alternatively, they use metaphorical expressions such as 'guerrilla groups' (*youji dui*) and 'irregular army' or 'irregulars' (*fei zhenggui jun*), which reveal their strong antagonism towards the *getihu* involved in DEEE collection and recycling (see also Chaturvedi/Gidwani 2010; Gidwani 2013 on India). Actors and entities deemed informal are described as 'dirty' (*zang*), 'messy' (*luan*), 'scattered' (*san*) and 'hard to manage' (*buhao guanli*). This routine stigmatisation leads many in China to see them as a remnant of a bygone era and a disgrace to the country. In what are arguably extreme cases, some Chinese experts even refused to acknowledge their existence. Two foreign researchers reported, for instance, having been told by Chinese interlocutors that: "China has no informal sector" (personal communications by David RoCHAT and Stefan Salhofer in 2013 and 2014, respectively). Such a denial may seem absurd given the huge size of China's informal economy — Philipp Huang, for instance, calculated that it employed over 250 million people in 2006 (Huang 2009) — but it makes sense if we read it as an attempt at strengthening a country's reputation.

The exclusion of *getihu* by Chinese state policies runs counter to recommendations found in the scientific literature. Here, many authors contend that informal actors and entities should, on the contrary, be integrated into China's formal system for e-waste management

Commented [A5]: This order is grammatically correct. Written this way, the sentence means: "Among all existing problems, formalisation tackles one in particular, i.e. pollution [...]". The reverse order would produce a slightly different meaning, namely: "Among all possible endeavours, formalisation focuses on one in particular, i.e. tackling the problem of pollution [...]".

It is important to stick to the first meaning, because the following sentence ("However, at a deeper level [...]") is based on it.

(see, e.g., Chi et al. 2011; Wang et al. 2012; ILO China 2013; Yang et al. 2008). In my view, this discrepancy can be attributed to the fact that — though well-meaning — scholars' calls for the integration of *getihu* fail to recognise the significant differences, or even incompatibilities, that exist between *getihu* and the higher levels of the state administration. The two are organised in fundamentally different ways: whereas the Chinese state administration adheres to the bureaucratic ideal (hierarchical structure, written rules, standardised procedures, formal training, and so on), *getihu* — to the extent that they can be considered collectively — are more evocative of the adhocratic ideal (organic structure, flexible procedures, and so on). This mismatch stands in the way of the inclusion of *getihu* in the process of formalisation; it also explains the purely abstract nature of the issue thus far.

Due to their operational and organisational modes, *getihu* constitute a challenge for Chinese officials and other experts, especially those in charge of formalisation. Actors and entities such as *getihu* typically interfere with something that lies at the heart of what modern states are meant to do, which is to reorganise societies in ways that make them more legible to apparatuses of governance (Scott 1998). *Getihu*'s mobility and adaptability, for instance, impede modern spatial and economic planning. While doing research in China, I was struck by the conspicuous absence of state programmes targeting *getihu* in non-repressive ways. One legal document recognises *getihu* as significant players within the waste recycling business (MOC 1985), while another one suggests “consolidating small and medium-sized enterprises and self-employed households [...], and making full use of the power of scavengers [...] to form stable, efficient, safe and convenient recycling channels” (MOFCOM et al. 2016). However, these two documents constitute isolated instances and have little binding power. Therefore, I would claim that, broadly speaking, Chinese officials and experts have never really tried to address the challenge that *getihu* pose for them. For proponents of formalisation, it was obvious that *getihu* had to adapt to the central government's plans, not the other way around, and that their failure to do so only proved their incompetence.

Finally, the discourse of formalisation conflated *getihu*'s unregistered status, unregulated activity and perceived ungovernability with an infringing of the law. Many Chinese experts used the terms ‘informal’ (*fei zhenggui*) and ‘illegal’ (*weifa/feifa*) interchangeably and seemed to regard them as synonyms. When mentioning ‘illegal activities’ (*feifa xingwei*) committed by *getihu*, they mostly referred to DEEE importing or burning, which constitute unambiguous violations of easily identifiable legal provisions, but sometimes also DEEE dismantling, collection, and even transport, which, to the best of my knowledge, are not forbidden as such, and may or may not infringe Chinese laws depending on the context and circumstances. Likewise, expressions based on the word *hei* (‘shady’), such as *heibang* (‘gang’) and *heishe* (‘black market’), surfaced in discussions on a variety of DEEE-related issues. Informality and illegality can be entangled in multiple ways, which explains why they are often associated with one another (WIEGO 2015). Yet, the two concepts do not overlap; their relationship is more complex. Unawareness or carelessness may explain a certain level of **confusion between** informality and illegality, but the routine conflation of one with the other goes beyond that. In the context of DEEE collection and recycling in China, it seems to me that the indiscriminate use of the vocabulary of illegality to refer to a wide range of actors

Commented [A6]: This expression is correct and conveys exactly the intended meaning. “Confusion regarding” would not be appropriate, as it doesn’t emphasise the (blurred) relationship between two things.

and entities served to tarnish the reputation of, and to stigmatise, a category deemed undesirable (see also Goldstein 2016; Gidwani 2013).

4. *Getihu*'s reversal of fortune

As stated above, *getihu* accounted for the vast majority of DEEE collectors and recyclers in China up until the late 2000s. From that time onwards, the development of the state project of formalisation gradually reduced their legitimacy, hindered their activities, and compromised their livelihoods. What follows is an illustration of these changes through two case studies that draw primarily on my fieldwork in Guangdong Province. Interestingly, both case studies reveal linkages between so-called formal and informal actors and entities, which suggests that formalisation can only go so far, and that, in order for the new 'system' to be effective, some level of informality needs to be maintained.

4.1 Rural recycling hubs

Guangdong Province, China's laboratory for economic reforms and largest economic powerhouse, hosts several rural recycling hubs, by which I mean towns and villages located in the countryside where industry has all but replaced agriculture, and the extraction of economic value from waste material has become the main source of livelihood. As part of my fieldwork, I visited several of these hubs regularly, including the town of Guiyu and the district of Qingcheng, which belong to the prefectural cities of Shantou and Qingyuan respectively.

A pattern emerges when we look at the evolution of these two hubs in recent years. For a long time, village, town and district-level authorities remained lenient towards 'small dismantling and processing workshops' (*xiao chajie zuofang*). However, their attitude changed drastically in the mid-2010s, when, pressured by city and province-level authorities to clean up their act, they started 'cracking down' (*qudi*) on these workshops. At the same time, state authorities at these different levels collaborated to create or expand dedicated industrial parks in order to concentrate and better control dismantling and processing activities, a strategy referred to as 'enclosed management' (*quanqu guanli*). Officially, small workshops were invited to resettle in these parks, but few of them were willing or able to do so. Eventually, the vast majority had to close down.

Guiyu has been in the spotlight for almost 20 years and has a reputation as a highly polluted place. Since the early 2000s, the town has received considerable negative publicity, in particular from NGOs and the media, both Chinese and foreign (see, e.g., Puckett et al. 2002). It is, or at least was for a long time, arguably the largest so-called 'informal' DEEE recycling centre in the world; and it seems safe to assume that, were it not for Guiyu, China would never have earned the label of "largest e-waste dumping site in the world" (Wang et al. 2013). Most accounts attribute Guiyu's plight to environmental dumping. However, a glance at neighbouring towns and villages warrants a more nuanced view. Some of them are involved in other industrial activities, in particular manufacturing, and yet also face extreme pollution. Gurao, for instance, long held the title of China's underwear capital. The town is located only nine kilometres away from Guiyu and the environment there presents similar

characteristics, i.e. black streams, foul air and uncontrolled dump sites. This indicates that the whole region — like many others in China in the late twentieth and early twenty-first century — embraced the pursuit of growth at all cost, with the blessing of higher-level state authorities and the backing of lower-level ones. Much like elsewhere in China, people in rural recycling hubs resigned themselves to sacrificing the natural environment on the altar of economic development (Economy 2010). Collective concerns about the pollution caused by scrap dismantling and processing emerged as an afterthought (Minter 2013). To be prosperous, Guangdong Province needed great quantities of raw materials to feed its factories; DEEE made for a good source, as it contains valuable metals (copper, gold, silver) and plastics, and, for many years at least, could be obtained relatively easily on global markets.

In the mid-2000s, in response to sustained public attention on Guiyu, the central government stepped in and attempted to revolutionise the recycling hub and redress its thoroughly negative image. As a foreign reporter writes:

in 2005 [the National and Development Reform Commission], in concert with six additional high-level Chinese government agencies, announced that Guiyu would receive significant funding to upgrade its facilities in line with China's new emphasis on sustainable development. According to the government's announcement, officials would "accelerate the construction of Guiyu into a national demonstration base for recycling". (Minter 2013: 191)

Such a concerted measure suggests that officials in Beijing initially intended to improve Guiyu and turn it into an exemplary place. The central government even included the town as a 'unit' (*danwei*) — note the bureaucratic terminology — in what was to become China's "first batch of circular economy national pilot projects" (*quanguo di yi pi xunhuan jingji shidian*) for DEEE recycling.

Yet, Beijing's grand plans to transform Guiyu into a fully regulated competence centre for DEEE dismantling and processing did not materialise. For a long time, not much happened. The construction of an industrial park, in particular, was delayed by about nine years. During that time, all the project amounted to was a large signboard and a vast stretch of wasteland. Between the mid-2000s and the mid-2010s, it was very much business as usual in Guiyu (Minter 2013: 190). It seems fair to say that Beijing's initiative ground to a halt not long after it was launched, which arguably owes much to the strong alliance between local officials and 'bosses' (*laoban*).

When I visited Guiyu in January 2016, a serious crackdown on small workshops had just taken place and its impact was obvious: the endless to and fro of trucks carrying goods had all but ceased and thousands of migrant workers had left to look for employment opportunities elsewhere (BAN 2015). Beilin, a village that had morphed into a town district over the years, was particularly badly hit. Of the hundreds of workshops specialising in circuit boards and other electronic components that used to operate there, only a handful remained active. The silence, the empty streets and the closed gates stood in stark contrast to the atmosphere that had prevailed only a couple of years earlier. Elsewhere in Guiyu, a greater proportion of workshops kept running but business was clearly moribund.

At about the same time as the crackdown took place, Guiyu's official 'circular economy industrial park' (*xunhuan jingji chanye yuanqu*) finally became a reality (for an extensive

Commented [A7]: This is the official translation in English of the Chinese expression. That's why I don't use 'circular economic'.

analysis of the park and its impact, see Schulz/Lora-Wainwright 2019). When I explored it in January 2016, construction was nearing completion and several sections were already operational. The park was huge, but largely empty; only very few workshops had resettled there^v. I interviewed a few owners, and none had anything positive to say about it; all of them voiced their discontent. For them, the park brought mostly drawbacks and few if any benefits.

For one thing, facilities did not suit small workshops' needs and capacities. Among the multi-storied buildings dedicated to dismantling, for instance, only the tallest ones had lifts; the others did not. One dismantler who had settled in a three-storied building explained that he only used the ground floor, although he was paying rent for the remaining floors as well. "I'd have to pay my workers more to have them carry these heavy bags upstairs [for storage] and then back downstairs [for dismantling]. This is hard work, so they'd certainly ask for a rise. I might even have to hire more people, which would cost me a lot of money." This is just one of many examples of the kind of challenge faced by workshop owners in an industrial park that had allegedly been built for them, but without them ever being consulted. Another example is the additional costs linked to the obligation to pay rent and taxes (which can easily amount to 100,000 RMB or 16,000 USD annually, according to my recent interviews in Guiyu). When joining parks, workshops can no longer avoid these costs, which in many cases are high enough to jeopardise their commercial viability. One owner told me: "I'm still in this business now, but I might stop next year. In those conditions, it's just not worth it anymore. I hardly earn anything anymore."

As for benefits, the argument that the park allowed for cleaner DEEE dismantling and processing failed to convince many of my interviewees. One owner of a dismantling workshop, who had unwillingly resettled, commented in a sarcastic tone that "It's good that you've come, because you'll report back to the whole world on how environmentally friendly [*huanbao*] we've all become since we moved here. It was worth it, wasn't it? Look at how environmentally friendly this all is!" Actually, his activities had barely changed and their environmental impact, which was low to begin with, had not improved much.

During my last visit in May 2018, Guiyu's industrial park was full of people, goods and vehicles, and teeming with activity. By contrast, the rest of the town looked empty and felt sluggish. A few years earlier, an estimated 5,000 workshops were operating in Guiyu, but now only a handful remained (all of them workshops specialised in sorting plastics from DEEE). Some owners had managed to move their workshops into the park but most had simply had to close down (see also SCMP 2017). The population of migrant labourers, estimated at more than 100,000 people in Guiyu's heyday, had shrunk dramatically. Many locals faced the difficult question of what to do next and how to find a new source of livelihood.

The story in Qingcheng district closely resembles that in Guiyu, even though pollution there only started to make the headlines in the mid-2010s. At that time, most of the operations that had been involved in recycling forbidden types of 'e-waste' imports (e.g. electronics and house appliances) had already transitioned to permitted ones (e.g. electrical cables and motors). Nevertheless, local authorities cracked down on small workshops and left them only a few months to resettle into existing industrial parks. Here again, most of the workshops closed down and very few of them moved. One of the owners I interviewed

estimated that his costs would double if he were to join a park. Qingcheng's main industrial parks experienced only marginal growth immediately after the crackdown.

In short, the entry into an industrial park comes at a high price for small workshops. They become subject to new rules that, in the majority of cases, require a major overhaul of their business model. Since small workshops do not receive help of any kind from state authorities, few of them manage such a challenging transition. More broadly, industrial parks introduce, and make mandatory, new forms of spatial, temporal and social organisation, which have very little to do with those that have powered rural recycling hubs thus far. Since they question the very core of economic activity in these places, industrial parks represent nothing short of a revolution. This undoubtedly contributes to explaining why they have met with limited success, at least to begin with.

Industrial parks in rural recycling hubs are arguably more attractive to large firms than to small workshops. A state-owned group named TCL established a presence in Guiyu's park as soon as 2013, before the construction of the rest of park had even begun. It is worth highlighting that, for the first few years at least, there was little overlap between the activities of TCL's DEEE dismantling plant and those of the surrounding small workshops, so the former hardly appeared as a substitute for the latter. The plant dealt exclusively with equipment for which it could receive subsidies, which, until March 2016, included only television sets, washing machines, refrigerators, air conditioners and computers (*siji yinao*) — in practice, TCL, like other licensed companies, secured only television sets, washing machines and refrigerators, and virtually no air conditioners or computers, as the latter had a high ratio of market price to amount of subsidy. By contrast, small workshops in Guiyu had built their prosperity almost exclusively on electronics (i.e. computers, mobile phones, printers, cameras, servers, routers) and parts or components thereof; they had very little interest in television sets and none at all in home appliances.

Later, after the central government had revised the amount of subsidy for computers and television sets, and made small electronic devices eligible too, TCL's plant in Guiyu became involved with these categories of goods as well. The company quickly realised that it could save money and benefit from the knowledge accumulated by neighbouring workshops over the years by outsourcing part of the dismantling process to them. When asked where the printed circuit boards processed in some of these workshops came from, several employees interviewed in 2015 pointed to TCL's plant across the road. One owner of a workshop specialised in the dismantling of hard disks claimed that he now had a subcontracting agreement with TCL. Outsourcing of this sort shows that interdependencies exist between so-called formal and informal actors and entities (see Chen 2006) even when they are not planned as part of the 'system', and most certainly not allowed by it.

4.2 Urban collection networks

As noted above, in Chinese cities, *getihu* long dominated the collection of objects discarded by households, offices and small businesses, including packaging, furniture, clothes and electrical and electronic equipment. Like a web that extends over the city, they could be found just about anywhere, especially in densely-populated areas. Often referred to as 'junk collectors' (*shou polan*) and 'pedlars' (*xiao shangfan*), they provided valuable services to residents, including buy-back of unwanted possessions, free home pick-up and

constant on-call availability. In downtown Guangzhou, where I used to live and work in the mid-2010s, *getihu* represented the most efficient channel for getting rid of DEEE. Large retail chains occasionally organised take-back actions and a few companies had launched specialised online platforms, banking on the trend towards digitalised lifestyles, but opting for *getihu*'s DEEE collection services remained the obvious thing to do for all except the largest companies and state entities. This can be explained by long-standing habits (see above) as well as *getihu*'s competitiveness — itself the result of hard labour, rigorous cost saving and a diversified strategy for extracting value out of cast-off goods (Li 2002; Schulz/Steuer 2017; Steuer et al. 2017).

Some forms of state action reflect *getihu*'s efficiency in DEEE collection and the difficulty of bypassing them in this field. The fact that China's Regulations allow for 'multi-channel collection', for instance, can be interpreted as an indirect recognition by the central government of the need for licensed DEEE recycling companies to make use of *getihu* networks, at least in a first stage. According to one estimate (Steuer et al. 2015), these companies sourced between 85 and 100 percent of their input from *getihu* in 2015 (see also Chen 2017). It should be noted, however, that Chinese experts viewed this as an anomaly. They predicted that it would disappear following the advent of what they considered to be superior collection schemes based on 'reverse logistics' (*nixiang wuliu*) and 'big data' (*da shuju*), which were expected to install corporations as the main protagonists of DEEE collection (Schulz 2019).

Likewise, in several areas of Guangzhou, state authorities at the lowest administrative level (subdistrict office or *jiedao*) sought to integrate junk collectors into their 'sanitation' (*huanwei*) teams and, by implication, the state apparatus. Conscious of the fact that, to quote a Chinese researcher, "if it weren't for independent rubbish collectors, nothing would get sorted in neighbourhoods", low-level officials drafted a few of these collectors, acknowledged their existence, adopted rules regarding their activity, and vouched for them. They issued them with a certificate, equipped them with uniforms, and housed them in new sheds, hereby signifying that they were legit — and that the others were not. With this measure, local officials aimed at enhancing the collection and sorting of 'domestic waste' (*shenghuo laji*) in the territory under their jurisdiction; improving *getihu*'s lot was beside the point. Thus, here again, formalisation occurred largely at the latter's expense. It did not bring *getihu* any benefits — apart perhaps from some level of assurance that they could continue operating — but it introduced new costs (rent), obligations (report to superiors) and handicaps (loss of operational freedom and flexibility). Besides, in Guangzhou at least, the forced integration of a small number of independent collectors remained a localised *ad hoc* measure tolerated but not endorsed by the municipal government.

It should be stressed that these instances of relatively inclusive state action are the exception, not the rule. They contrast with the more general trend that has been affecting independent collection networks in Chinese cities in recent years, namely dispossession and displacement. Whether because of real estate development, urban renewal and 'beautification' (*chengshi meirong*) programmes or public-private partnerships, *getihu* involved in collection have progressively been denied access to DEEE and debarred from using public space. Deprived of any right to the city (Lefebvre 1968, Harvey 2008) and, concomitantly, any right to waste (Chaturvedi/Gidwani 2010), they have been struggling more and more to make a

living in a context of constant urban transformation. A particularly telling example is Beijing, where independent collectors have met such hurdles that thousands of them have given up, and either returned to their hometowns or switched to another occupation (Chen 2017; Goldstein forthcoming).

5. Conclusion

What shows through in the above case study on DEEE collection and recycling is a shift in China's development ethos. Whereas the early reform era was characterised by a free-for-all ideology and the promotion of petty capitalism as a means of driving growth, boosting national productivity, and creating wealth, the late reform era — and even more so the post-reform era, with Xi Jinping's coming to power — has been marked by a trend towards increased regulation, centralisation and assertion of state power, which can be seen as the central government's response to the challenges posed by environmental degradation and economic deceleration, as well as to the risk known as the 'middle-income trap'.

For foreign players on global scrap markets, this shift became apparent with the restrictions on imports that the central government put in place from the early 2010s onwards. The wide-ranging ban announced in July 2017, in particular, acted as a wake-up call and made it obvious to everyone abroad that Beijing is trying to move China up the value chain. By that time, however, the wind of change had been blowing within the country for many years already, and Chinese players had felt it in full. *Getihu*, in particular, found themselves left out from, and excluded by, the state programme of formalisation, a phenomenon I have described in detail above. Routinely labelled 'informal', these actors and entities were stigmatised and treated as pariahs. They had no say in the transformation of DEEE collection and recycling brought about by the central government; and were prevented from playing a role in the new 'system' with which Beijing progressively equipped the country. The new rules of the game valorise and promote an entirely different type of subject, deemed less reminiscent of the country's past and more promising for its future. This translates into a loss of livelihood for the multitude of peasants turned entrepreneurs who had dominated this sector until recently.

The exclusion and dispossession of these people is surprising, for they have been particularly hardworking, resourceful and efficient throughout the reform era. Amidst unfavourable circumstances and in the shadows of the state and corporations, they have established and effectively operated their own networks of material exchanges, which persist to the present day. Through collective effort and highly flexible forms of organisation, these so-called 'irregulars' have devised a system capable of converting huge quantities of DEEE (and other discarded items) into useful raw materials and spare parts. In doing so, they have come up with relatively appealing solutions for a wide range of customers, including households and enterprises. Such a system — despite its flaws in regards to pollution — contrasts with the formal 'scaling up' strategy. It presents itself as an alternative, the existence and success of which urge us to question the state's dogmatic zeal for generating 'modern', large-scale and capital-intensive solutions for DEEE management.

As it matures, will China's state-led system for DEEE collection and recycling succeed in transforming the sector into an entirely formal one? Nothing could be less certain. Even in 'developed countries' — which are held up as models by Chinese experts — formal 'systems' coexist with informal networks. In Europe, for instance, researchers found that, in 2012, only 35% (3.3 million tons) of all DEEE ended up in the officially reported amounts of collection and recycling systems. The other 65% (6.15 million tons) was either recycled under non-compliant conditions in Europe (3.15 million tons), exported (1.5 million tons), scavenged for valuable parts (750,000 tons), or simply thrown into waste bins (750,000 tons) (Huisman et al. 2015). By definition, informal practices and protagonists are off the radar. We know, however, and I have stressed in this article, that they play a crucial role. Often, they even act like oil in the cogs of the formal economy. In China, scrapping 'irregulars' involved in DEEE collection and recycling has proven to be a lengthy and uncertain process thus far, with many unexpected or unwanted effects. Chances are that it will continue along this line. At least, we can expect that this process will not put an end to informality, which has a strong tendency to reappear in new forms.

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Abstract German (will be translated by the editors)

Yvan Schulz
China Centre, University of Oxford
yvan.schulz@area.ox.ac.uk

ⁱ DEEE is indirectly affected, as it contains plastic types covered by the ban.

ⁱⁱ In Chinese law, the term *getihu* applies to enterprises that have 8 employees or fewer.

ⁱⁱⁱ It has become increasingly obvious in recent years that Xi Jinping's accession to power in 2013 marked the end of the reform era and the beginning of a new one, yet to be named.

^{iv} Following Stehr & Grundman (2011), I use the term 'expert' in a narrow sense as referring to people who not only have expertise on a given topic but also recommend a course of action to others based on technical information.

^v From what I heard, this seems to have changed very recently.