Commentary: Made in China and the new world of secondary resource recovery

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On 18 July 2017 the Chinese government informed the World Trade Organisation of its intention, by year end, to ban imports of recovered mixed paper, recycled plastic, textiles and vanadium slag. In April 2018 China extended that ban to another 32 categories of used goods and materials, including scrap metal. Another 16 categories are banned from the end of 2020 and new standards applied to others. Suddenly, waste and recycling had catapulted from industries that few cared much about to the top of the agenda of the primary body governing global trade (www.resource-recycling.com – 27 March 2018) and onto the desks of municipalities and governments across the world. Why? Because in 2015 and 2016, the last available official figures show China (often via Hong Kong) imported at least 48.2 and 46.7 million tonnes, respectively, in the customs categories that include the affected wastes (comtrade.un.org).

China's ban has triggered a crisis in the governance of global waste flows. It marks a fundamental challenge to the spatial fix that has characterised secondary resource recovery since the 1990s. In broad terms, that saw goods and materials declared waste in the Global North flow to China and the Global South, to be sold as second-hand goods, for reconditioning or repair, or to be recovered as cheap materials for further manufacturing (Tranberg-Hansen, 2000; Iles, 2004; Rivoli, 2005; Gregson et al. 2010; Lepawsky & McNabb, 2010; Gregson et al. 2012; Minter, 2013; Brooks, 2015; Lepawsky, 2015). Paying attention to waste and recycling alters prevailing accounts of Global North and Global South. Inverting the expected trade patterns, buyers and traders from China and the Global South harvest

the wastes of the Global North (Abimbola, 2012; Alexander and Reno, 2012; Brooks, 2012; Minter, 2013). Further, global resource recovery can be seen to be about meeting demand in production, rather than dumping waste on the environments and peoples of the Global South as global environmental justice literatures suggest (Clapp, 2001; BAN, 2002; Pellow, 2007; c.f. Lora-Wainwright, 2017). China's ban, however, signals that a major reworking of the economic geography of global resource recovery is in process.

In under a year, the Chinese government has thrown the global recycling industry into disarray. In banning these imports, China is shifting from being the metaphorical equivalent of the world's vacuum cleaner, hoovering up the majority of what the developed world declares to be rubbish, to being a highly selective importer of certain categories and grades of recoverable materials and a major generator and exporter of post-consumer discards. For instance, China is emerging as a major exporter of textiles and used clothing, with Chinese-manufactured and styled clothing increasingly prominent in African used-clothing markets (Postrel & Minter, 2018).

Current discourse in the Global North trying to explain the China ban (e.g. House of Commons Environmental Audit Committee, 2018) points to a supply-demand logic, specifically the substitution of domestically generated waste for externally harvested, as rising levels of domestic consumption have led to increased levels of domestically generated post-consumer discard. Other commentators argue that goods made in China for domestic consumption are manufactured to poor standards and are a source of poor quality recyclate (@AdamMinter – 4 May 2018). They highlight that Chinese goods made for global export often use higher quality materials. It is the latter materials that matter most for secondary resource recovery. If one accepts these arguments, the supply side is not the main driver

behind the China ban. Instead there is a need to look to the demand side, particularly at manufacturing. In 2015 the Chinese government launched its Made in China programme. Alongside an ambitious plan to upgrade production, moving it up the value chain, it recognised the poor quality of Chinese production for domestic consumption, and announced a parallel ambition that 95% of consumer goods manufactured for the domestic market will be at international standards by 2020.

The effect of the political commitment to the wholesale upgrading of Chinese manufacturing will be felt acutely in the secondary processing agglomerations that have emerged organically in China since the 1990s (Tong and Wang, 2004). They are geographically proximate to the main South China ports and are heavily reliant on imports harvested from the Global North. An estimated 90% of materials passing through them are derived from OECD countries. Each cluster is dedicated to particular materials recovery streams. For example, Luqiao (an e-scrap centre) comprises 44 state-certified importers, 172 firms, 50 dismantling sites, 7 specialised markets, 3000 disassembly enterprises and over 2000 'self-employed entrepreneurs' (Chi et al. 2014). These labour intensive industries, however, have no place in the imaginary that informs current economic policy in China. Indeed, their presence is a barrier to China's upgrading ambitions.

In the remainder of this commentary we draw on 'grey' literature and trade press to provide 1) a synthesis of the policy developments that are currently upturning global resource recovery and consider their ramifications within China.[1] 2) Taking the UK as our main case,

[1] Key sources for China's policy trajectory are: www.resource-recycling.com ; www.waste360.com; www.letsrecycle.co.uk; www.recyclinginternational.com. Primary news stories are cited in the references.

we show what China's ban means for states accustomed for decades to having China absorb their post-consumer discards. 3) We close by suggesting some research priorities in light of these developments.

China's Green Fence and National Sword: protectionism in the service of ecological modernisation and economic upgrading

Although China has been talking of sustainable development (*kechixu fazhan*) since the 1990s, responses to previous scandals and exposés of poor practices in the recycling sector had been noisy but superficial, with promises of action and new regulations that were largely unenforced (Schulz 2018). In 2012 at the 18th Party Congress, Xi Jinping declared a new strategic goal - 'Building a Beautiful China'. That formed the rallying call for an 'ecological civilisation' (*shengtai wenming*). The first warning tremors of the current crisis in the governance of global waste flows then came in February 2013, when China imposed the 'Green Fence'. This comprised unprecedented inspections of imported 'scrap' materials to assess whether their quality met national standards. In the first year of Green Fence's operation 70% of inbound containers carrying scrap were inspected, leading to major delays in ports, shortages in downstream supply chains, reductions in import licences and knock-on difficulties for those seeking to sell recovered materials in the global commodity markets. Green Fence imposed a contamination threshold of 1.5%/bale, meaning any bale found containing more than 1.5% 'non-target' material (e.g. plastic in paper) would be rejected. An estimated 800,000 tonnes of material were rejected in the first six months (and sent back,

at cost, to shippers), whilst 247 importing companies saw their import licences suspended (The Guardian, 27 Oct. 2013)

In February 2017 Green Fence was superseded by National Sword. That policy flagged a crackdown on 'foreign garbage smuggling', with a focus on e-waste, industrial waste, and plastics waste. For the waste and recycling industry of the Global North, National Sword's apparent focus on smuggling appeared to target the illegal end of the waste market. That assessment, however, soon proved very wide of the mark: a top leaders' meeting in April 2017 announced that China would significantly reduce both its categories and volume of scrap imports. Almost immediately exporters reported import fees doubling, and major challenges in trying to get material into China. By July the WTO had been informed of a ban on 24 categories of material, including plastics and mixed paper. Even for categories not named in the ban, in October 2017 China raised the threshold to 0.5% contaminants. This threshold is beyond the capability of the mechanical materials recovery infrastructure in the Global North, so it amounts to a ban in all but name. Subsequent announcements in 2018 extended the ban to include most categories of recovered materials hitherto exported to China.

The result has been a twin-pronged crackdown; on the import of what the Chinese government describes as 'foreign garbage' and on parts of China's secondary processing industry. The label 'foreign garbage' mobilises environmental justice campaigns and binds them to the nationalist agenda in Xi's 'Beautiful China' campaign. Those NGO campaigns made China a poster child for environmental pollution. That representation is increasingly discordant with the Chinese government's understanding of China's place in the global world order. The outcome is a crackdown on those industries that enable and depend on

'foreign garbage smuggling', that is labour-intensive forms of secondary processing, and the promotion instead of what are seen to be modern, 'clean and green' (*qingjie shengchan* and *luse fazhan*) capital-intensive technologies of materials recovery offering 'ecological modernisation' (*shengtai xiandaihua*).

Contemporaneous with, and allied to, the drive to ecological modernisation has been the promotion of circular economy ideals of closed loop materials circulation. In respect of e-waste, to take just one sector, the Circular Economy Promotion Law (2008) has seen the development of a form of extended producer responsibility (EPR), in which the government charges fees on Chinese manufacturers which are then used to subsidise state-certified (formal) recycling companies (Inverardi-Ferri, 2017a). In accordance with industrial ecology principles, electrical and electronics manufacturers are encouraged by law to create their own recycling plants (Schulz, 2015). Scrappage policies, notably the "Home Appliance Old-for-New Rebate Program" (*jiadian yi jiu huan xin zhengce)* (2009-11), which sought to boost domestic consumption post the 2008 Global Financial Crisis, required used goods to go to state-certified recycling companies rather than the informal sector (Inverardi-Ferri, 2017a).The former are capital-intensive and typically located in an eco-park, not in the existing secondary processing agglomerations. There is some doubt as to their efficacy when compared to the productivity of those established agglomerations; doubly so, given the incentives are to scrap goods and recycle materials rather than recondition and reuse them (Schulz 2018).

To date, academic literature discussing the crackdown on labour intensive secondary processing in China has focused upon the displacement of previously tolerated informal, recycling in major cities (Tong & Tao, 2015; Inverardi-Ferri, 2017b; Schulz 2018). Whilst the

informal waste markets of cities have been one target of recent Chinese policy, another is the secondary processing agglomerations reliant on globally sourced imports. These agglomerations have been most affected by the Green Fence and National Sword. Import licenses have been revoked or severely restricted, and there have been widespread delays in moving shipments through the ports, with knock-on consequences for onward markets and supply chains. Policy has starved these agglomerations of feedstock, rendering it unpredictable and highly volatile. The response, however, is not the intended disappearance but rather capital shift and geographical displacement. In early 2018, the trade press was reporting that Chinese plastics re-processors had shifted operations to Vietnam, Malaysia and Thailand, where they are stated as producing materials to standards that meet Chinese acceptance criteria (www.resource-recycling.com – 3 April 2018). It is entirely possible, then, that the recent uplift (from a small base) in scrap imports by these states is indicative of the conjuncture of the mobility of certain fractions of Chinese capital (specifically traders, entrepreneurs and low capital technology) with the relatively lax waste import regimes of other states in South-east Asia.

China's Green Fence and National Sword policies are but the most recent demonstration that waste and recycling are highly political markets, framed by policies that disallow some practices (dumping, polluting or burning) whilst incentivising others (e.g. scrapping or recycling) that configure both costs and (potential) resources. These markets indicate that the scale of analysis for waste and recycling is not confined to the household, the city or the national but is framed globally and characterised by connections and interdependences. We therefore consider the wider reverberations of China's ban, with a focus on the EU and particularly the UK – the member state hitherto most heavily reliant on exports to China.

The case of UK municipal waste in light of the China ban

To understand why China's ban reverberates with such force in the UK, it is necessary to outline particularities of its municipal waste infrastructure, which in turn account for its dependence on the Chinese market.

Current waste infrastructure in the UK

EU-level policy embraced the Basel Convention and endeavoured to keep wastes generated within the EU within its own boundaries – although the leakiness of wastes across those borders, licitly and illicitly, is well established and evidenced by global trade. Simultaneously, it developed a preferential way of classifying options for dealing with waste materials, from landfill at the bottom, through incineration, and recycling/recovery, to re-use and reconditioning and waste prevention at the top – the 'Waste Hierarchy'. That hierarchy was incentivised financially, through fines applied to member states whose performance did not match rising targets.

In the UK this meant a dramatic shift, starting in the 1990s, from a historic reliance on landfill. Unlike the situation in Sweden, say, where public trust in incineration led to the development of a waste infrastructure of municipal combined heat and power, in the UK public opposition to energy-from-waste plants ('incinerators') led to a Waste Strategy (2002) that sought to divert waste materials from landfill to recovery for recycling. Mostly, and in line with the marketization of public sector services in the UK, this involved local government establishing public-private partnerships for municipal waste management. Local authorities contracted out their waste services to commercial firms, who, in handling municipal waste, guaranteed to achieve an agreed percentage diversion of waste from

landfill to recycling. The means to that diversion is capital intensive technology – in most cases a materials recovery facility, which is an industrial plant, which sorts materials into specific types and (a limited number of) categories. So, plastic from paper, paper from card, plastic and paper from glass.

The upshot was that tonnage diversion from landfill was the primary policy metric, and waste in the UK was economized and financialised on the basis of weight (Gregson et al. 2015). In accounting terms, what mattered for UK policy was to demonstrate the weight of material diverted from waste (landfill) by being recovered for recycling. Translated into a commercial operating environment, that meant that UK materials recovery plants were designed to process large amounts of garbage, separating it rapidly into materials types. This (crude) sorting valorises wastes in terms of quantity rather than material quality (defined in terms of low percentages of contaminants). Significantly, this means such reclaimed materials are only of interest to those who either are using low quality inputs or can undertake further, laborious reprocessing and sorting. Hence the UK came to depend on exporting low quality waste to China: for instance, in 2016, the UK collected ~8m tonnes of paper fibre, of which over 60% was exported, with 47% going to China (Recycling Association, 2018).

As the reconfiguration of waste through circular economy thinking has gained traction in European policy, alongside moral economies of the proximity principle and geostrategic concerns over resource security, there is an increasing focus on circulating high quality recyclates within the EU. The nature of the UK's municipal waste infrastructure with its 'comingled collection' systems, poor quality outputs and reliance on global export markets were all singled out for high level political criticism – not least because, in their dependence

on the global trade in wastes, they undermined the political attempt to create a European circular economy (Gregson et al. 2015). Brexit may offer new options in a dispute that can be seen as the latest European waste controversy where the UK is positioned as "the dirty man (sic) of Europe". But, now the China Ban, and the removal of the UK's primary waste export market, changes the options available.

The emerging municipal waste crisis in the UK – a crisis of economization

The implications of China's ban for the UK's municipal waste infrastructure are far-reaching. In the short term it has resulted in the physical accumulation of material in facilities, the sale of material down (not up) the Waste Hierarchy (i.e. instead of recycling there is energy reclamation, and in some instances, allegedly, landfill) and attempts to improve the quality of materials emanating from materials recovery facilities. The latter involves increased levels of manual labour, or 'dirty work' of the type that 'clean and green' ecological modernisation was meant to eliminate (Gregson et al. 2016). In the UK, much of that labour is performed by migrant workers, who, post Brexit, may be unavailable. Beyond the short term, however, this is a crisis of municipal waste's economization. Currently, it manifests around questions of financialisation and governance.

The crisis in financialisation is signalled by intense discussion within the sector on contracts (www.letsrecycle – 23 March 2018, Webinar – 26 April 2018). The capital intensive MRFs were funded on the basis of long contracts (10 to 15 years or longer) to recoup costs in what seemed a low risk market with a guaranteed supply and growing demand. The sudden removal of the Chinese market disrupts the second assumption at a stroke whilst the additional reprocessing to reduce contamination increases operating costs. At the time of

writing (June 2018), commercial operators are calling for contract renegotiation and better risk sharing between the commercial sector and local authorities, but whether local authorities, whose budgets have been slashed by years of austerity, have the capacity to take on more of the financial risk is, to say the least, debateable.

Looking to the future, it is not inconceivable that some firms will walk away from contracts and investments. Should they do so then local authorities will have a full blown public waste crisis on their hands. In the interim, the ability of local authorities to control the kind of waste generated by their populations is in capital's cross hairs. When commercial operators publicly declare that they are "neither alchemists nor magicians" and state their refusal to engage with recycling collections that are 30% contaminated, they are firmly laying the blame for the UK's poor quality recyclates with consumers and local authorities who fail to crack down on their publics' poor recycling practices. What remains tacit here is the process of economization that underpins the UK's municipal waste infrastructure. This has converted a statutory public service into a private asset capitalised through unpaid household labour (that in the UK has to be cajoled into sorting waste into even rough categories e.g. landfill, recyclables and (sometimes) organic food waste), least cost collection systems that move that more-or-less sorted material from households and businesses to facilities, which then sort that material, but only sufficiently to produce low grade materials sold into the commodity markets. To turn that infrastructure into a system for producing quality recovered materials will require nothing short of a write-off of existing systems of collection and of capital plant, and their replacement with technologies and labour that treat, rather than merely sort, materials. Small wonder, then, that capital is

currently positioning the UK municipal waste crisis as a failure of local authority governance rather than of municipal waste's economization.

Future Directions

By way of conclusion we offer suggestions for future research.

There is a need for empirical research in three areas. Firstly, to revise the map of secondary resource flows and establish the new spatial fix for resource recovery. Experience shows that, given the poor data reporting over 'waste' (to put it benignly), this needs on-the-ground work beyond official data. Figures show UK exports of plastic scrap to Malaysia, trebled in the four months post the ban, and those to Pakistan rose by 78%, to Vietnam 50%, to India 37% and Indonesia 19% (Independent 16 June 2018). That emergent geography however, is likely an under-estimate of actual flows and fluid in its geographical specifics. In Vietnam the shipping press reports not only that 'a dramatic increase in scrap-laden containers' forced Ho Chi Minh City's Cat Lai port to stop receiving plastic and paper waste on 1 June (due to 8,000 twenty foot equivalent of uncollected shipping containers of scrap cargo) but also that they were lacking valid permits, so they may be on top of recorded flows (Loadstar, 8 June 2018). Further, in late June 2018, shipping lines were notified that neither Vietnam nor Thailand would accept recycled plastic cargo imports – effectively banning these (declared) imports from parts of South-east Asia (www.rebnews.com – 22 June 2018). Second, there is a need for work in China to address the secondary processing zones that hitherto have been dependent upon globally sourced imports. How are these zones restructuring in the light of the ban? To what extent is Chinese capital in the recycling sector going offshore? Is this a matter of the off-shoring of

labour intensive resource recovery to proximate states in South east Asia? Are materials then actually still entering China – or, are they being sold globally? Simultaneously, there is a need to chart the progress (or not) of China's drive to harness domestic waste streams to establish a circular economy. To what extent is the drive for formalisation succeeding? Some indications suggest that, as in the West, formal capital intensive recycling may be dismantling and sorting materials but is outsourcing the difficult reprocessing, possibly away from coastal import sites to less visible, less developed locations in the interior (Schulz 2018). Third, it will be necessary to examine the crises in municipal waste governance in the Global North that have been set in train by China's ban. The UK may be the most affected of the European states, but at the time of writing there are parallel crises emerging elsewhere. In the US for instance, within two months of the ban, Oregon alone had already approved waivers to dump 6,107 tons of erstwhile recycling (Allington 2018; c.f. CBC – 27 December, 2017), while New Zealand has seen increased exports to South East Asia but still recyclers have said they are 'sitting on a massive amount of paper and plastics' (Radio NZ 5 April 2018).

There is also a need to move away from the Northern-centric imaginaries that have dominated research in the field. Rather than starting with the wastes of the Global North and seeing China as a receiving point or dumping ground, recent events have shown China to be the motor here; the world view therefore needs to be, if not China-centric, then with China at its centre. Yet there is a need to go beyond recycling economies to connect to debates over resource scarcity/security. At the same time as the trade press is reporting the geographical displacement of Chinese capital invested in resource recovery into proximate states in South east Asia, parallel reports indicate different fractions of Chinese capital

looking to invest in secondary materials recovery and processing in the Global North (www.resource-recycling.com – 3 April 2018). Of course, looking to invest is not inward-investment, but – should such investment begin to occur – it would indicate, that China's resource base is shifting to encompass urban mining on a global scale. It may be premature to talk of China's global urban mine but that new form of resource imperialism, in which the Global North is not just harvested but becomes the materials recovery location for 'Made in China', is the possibility that comes into view from a China-centred account.

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